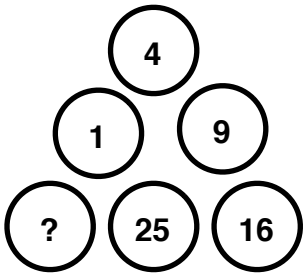
# What is the missing number?

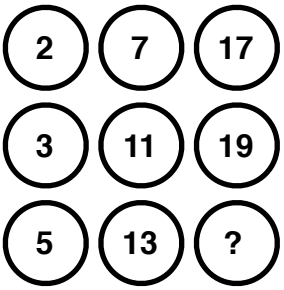
A Pattern Recognition Activity

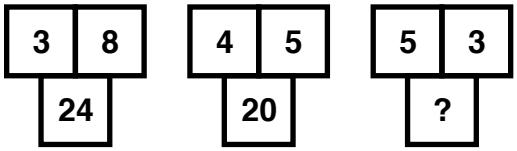
Products, Averages

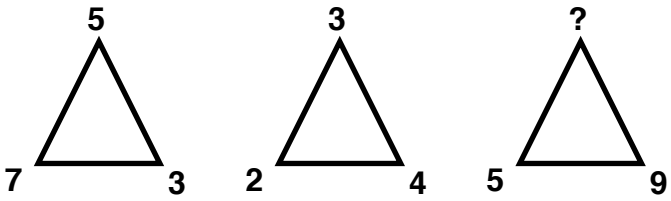
Prime and Square Numbers.




**Julie Eitel**



# Introduction

**What is the Missing Number?**

**Prime Numbers**

Prime numbers are whole numbers that are only divisible by themselves and 1.
1 is not considered a prime number. The only even prime number is 2.

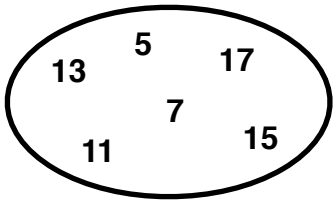
**Examples:** 5 is prime because the only numbers that divide evenly into 5 are 5 and 1.

11 is prime because the only numbers that divide evenly into 11 are 11 and 1.

12 I**S NOT** prime because 1, 2, 4 and 6 all divide evenly into 12.

**The Prime Numbers less than 50 are 2, 3, 5, 7, 11, 13, 17, 19, 23, 29, 31, 37, 41, 43 and 47**.

**What number does not belong in the oval?**




**Solution: 15.** All the numbers in the oval are Prime Numbers except 15.

**Square Numbers**

The product of a whole number times itself is called a Square Number. A Square Number is the number you get when you multiply a whole number by itself.

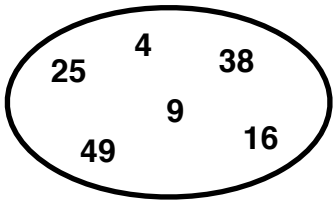
**Examples:**

$1 \bullet 1 = 1$ , $2 \bullet 2 = 4$ , $3 \bullet 3 = 9$ , $4 \bullet 4 = 16$ , $5 \bullet 5 = 25$ , $6 \bullet 6 = 36$ , $7 \bullet 7 = 49$

$8 \bullet 8 = 64$ , $9 \bullet 9 = 81$ , $10 \bullet 10 = 100$ , $11 \bullet 11 = 121$ , $12 \bullet 12 = 144$

**The first 12 Square Numbers are: 1, 4, 9, 16, 25, 36, 49, 64, 81, 100, 121, 144.**

**What number does not belong in the oval?**




**Solution:** 38 All the numbers in the oval are Square Numbers except 38.

## Products

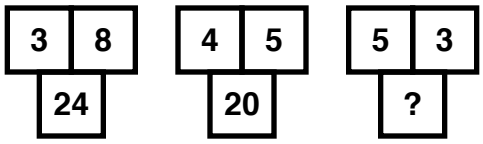
The product of a group of numbers is found by multiplying the numbers together.

**Examples:**

The product of 5 and 4 is 5 x 4 = 20

The product of 2 ,3 and 5 is 2 x 3 x 5 = 20

**What is the missing number?**




The number in the bottom square in each figure is found by multiplying the 2 top squares.

3 x 8 = 24 , 4 x 5 = 20 and 5 x 3 = 15.

**Solution: The missing number is 15.**

## Averages

The average of a group of numbers is calculated by adding up all the numbers in the group and then dividing that sum by the number of numbers that you added together.

**Examples:**

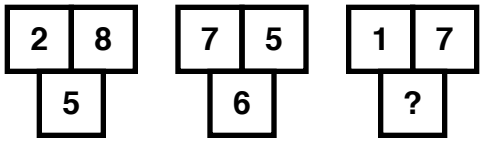
If you have 2 numbers their average is the **total of the 2** numbers **divided by 2.**

The **average of 4 and 8** is $\frac{8+4}{2} = \frac{12}{2} = 6$

If you have 3 numbers their average is the **total of the 3** numbers **divided by 3.**

The **average of 1 and 5 and 6** is $\frac{1+5+6}{3} = \frac{12}{3} = 4$

**What is the missing number?**




The average of 2 and 8 is $\frac{2+8}{2} = \frac{10}{2} = 5$ The average of 7 and 5 is $\frac{7+5}{2} = \frac{12}{2} = 6$

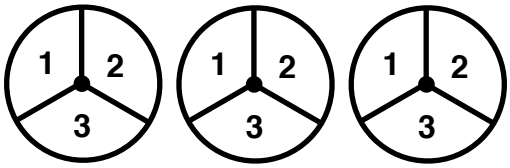
The average of 1 and 7 is $\frac{1+7}{2} = \frac{8}{2} = 4$ .

**Solution: The missing number is 4.**

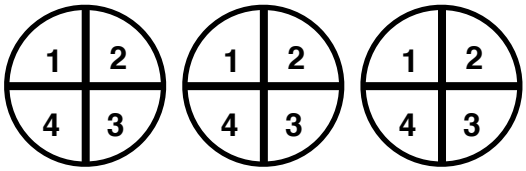
## Corresponding Positions.

The parts of each figure that are in the same position are in Corresponding Positions.

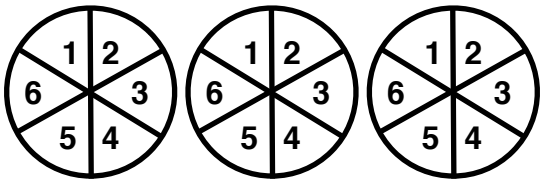
The 1 ‘s are in Corresponding Positions in each of the 3 circles. So are the 2 and 3’s.



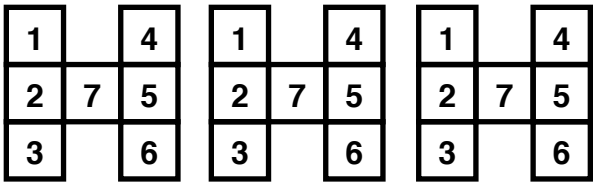

The 1 ‘s are in Corresponding Positions in each of the 3 circles. So are the 2, 3 and 4’s



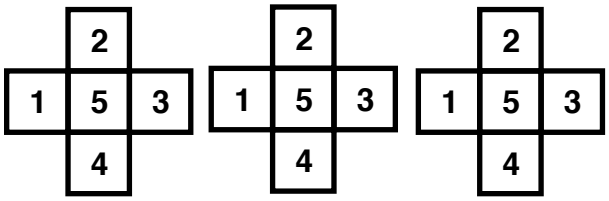

The 1 ‘s are in Corresponding Positions in each of the 3 circles So are the 2 ,3 , 4 , 5 and 6’s.



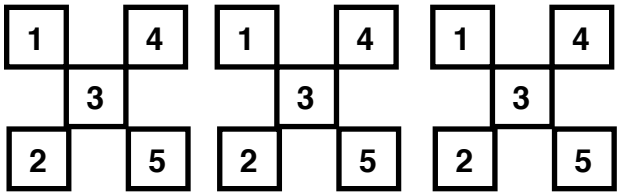

The 1 ‘s are in Corresponding Positions in each of the 3 figures So are the 2 ,3 , 4 , 5 , 6 and 7’s.




The 1 ‘s are in Corresponding Positions in each of the 3 figures So are the 2 ,3 , 4 , 5 and 6’s.

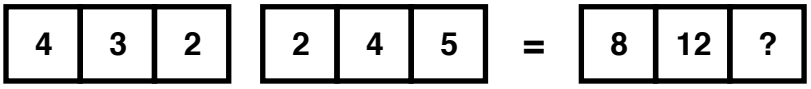



The 1 ‘s are in Corresponding Positions in each of the 3 figures So are the 2 ,3 , 4 , 5 , 6 and 7’s.

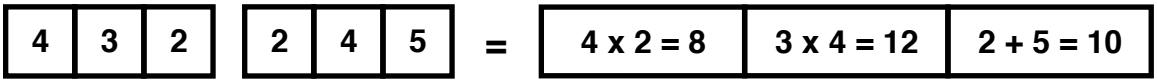



## Multiplying numbers in Corresponding Positions.

**Find the value for missing number represented by ?**




Multiply the numbers in the corresponding squares for the 2 figures on the left and put their products in the Corresponding Positions in the squares in the figure on the right.

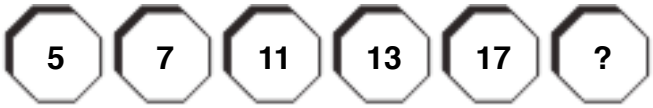



**2 x 5 = 10 so the missing number represented by ? is 10**

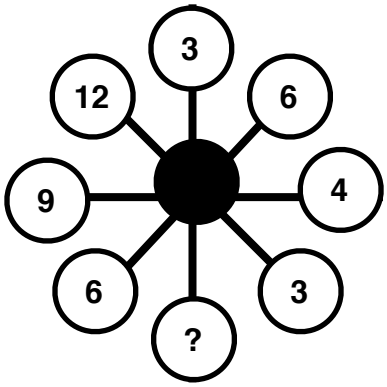
**What is the missing number?** **Name**_____

**Products , Averages , Primes and Squares**

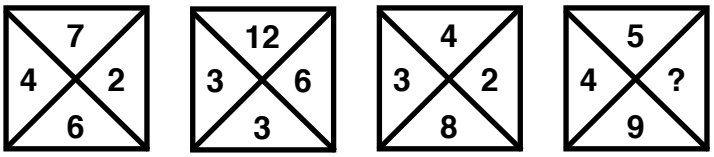
1. **What is the missing number?** _____
   **Hint:** Primes.



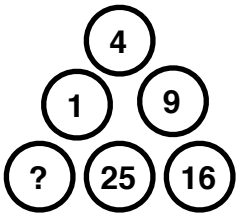

2. **What is the missing number?** _____
   **Hint:** Products.



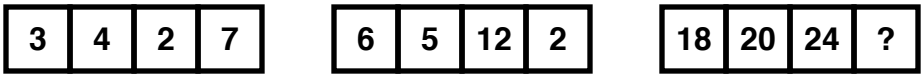

3. **What is the missing number?** _____
   **Hint:** Products.



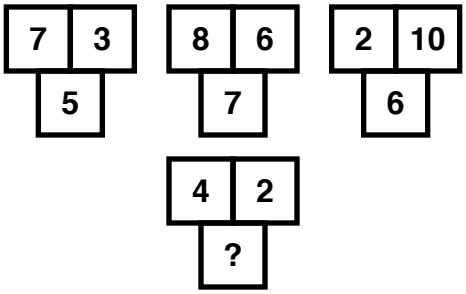

4. **What is the missing number?** _____
   **Hint:** Squares.



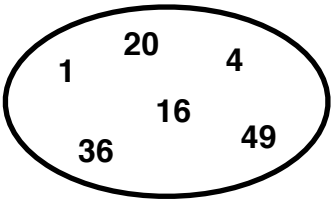
5. **What is the missing number?** _____
**Hint:** Products.



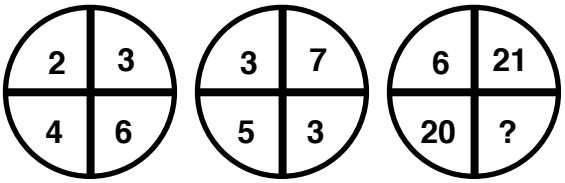

6. **What is the missing number?** _____
**Hint:** Averages.




7. **What number does not belong in the oval?** _____
**Hint:** Squares.

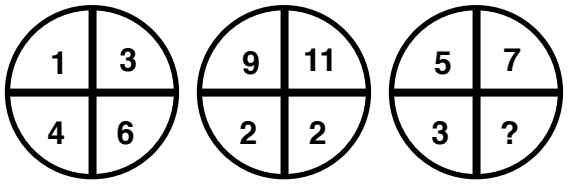



8. **What is the missing number?** _____
**Hint:** Products.



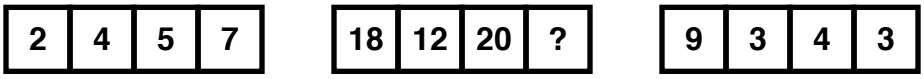
9. **What is the missing number?** _____

**Hint:** Averages.



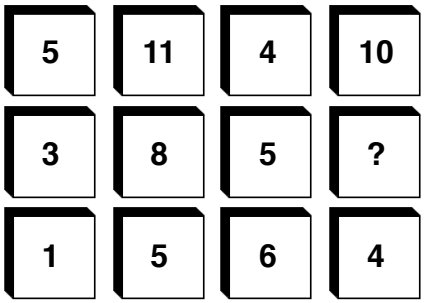

10. **What is the missing number?** _____

**Hint:** Products.



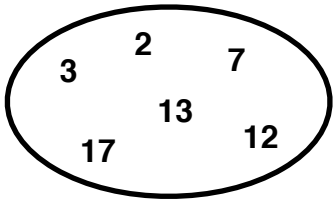

11. **What is the missing number?**

**Hint:** Averages.



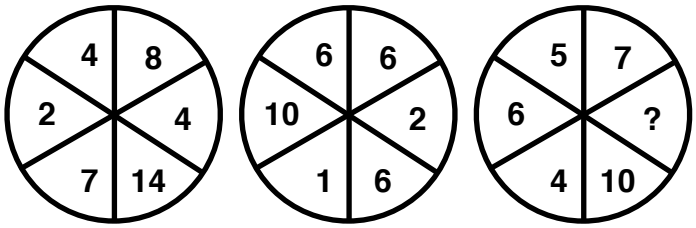

12. **What number does not belong in the oval?** _____

**Hint:** Primes.



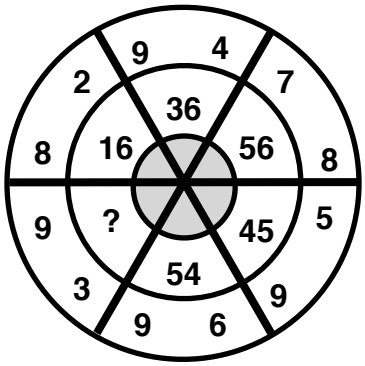
13. **What is the missing number?** _____

**Hint:** Averages.



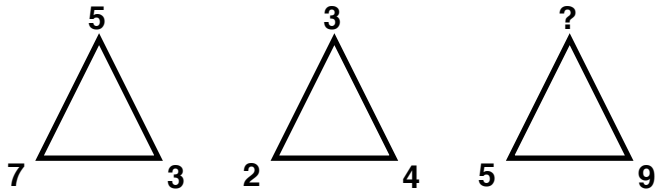

14. **What is the missing number?** _____

**Hint:** Products.




15. **What is the missing number?** _____

**Hint:** Averages.



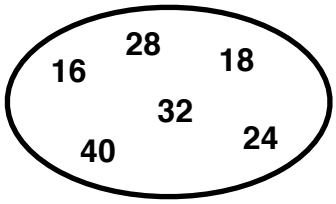

16. **What is the missing number?** _____

**Hint:** Products.

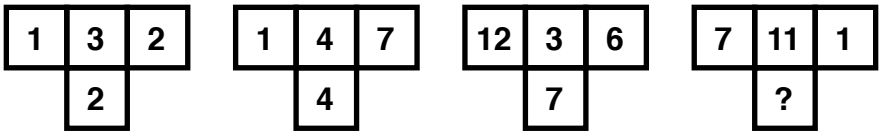
| | | | |
|---|---|---|---|
| 4 | 2 | 8 | 7 |
| 6 | 3 | 6 | 6 |
| 5 | 1 | 5 | 3 |

| | | | |
|---|---|---|---|
| 3 | 2 | 1 | 7 |
| 4 | 1 | 2 | 3 |
| 5 | 3 | ? | 6 |

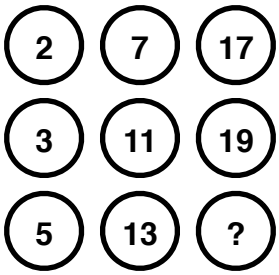
17. **What number does not belong in the oval?** _____
**Hint:** Multiples.



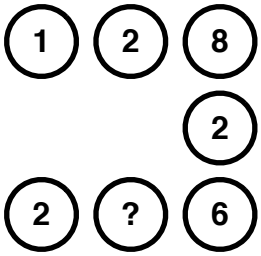

18. **What is the missing number?** _____
**Hint:** Averages.



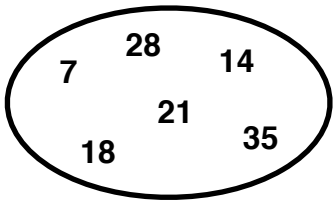

19. **What is the missing number?** _____
**Hint:** Primes.




20. **What is the missing number?** _____
**Hint:** Products.



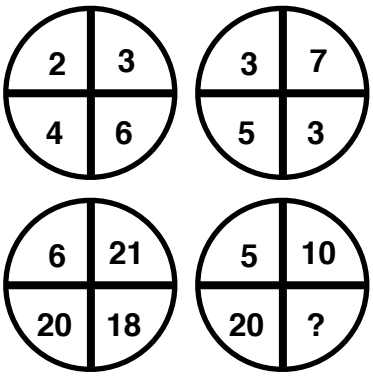
21. **What number does not belong in the oval?** _____
**Hint:** Multiples.




22. **What is the missing number?** _____
**Hint:** Double the numbers.

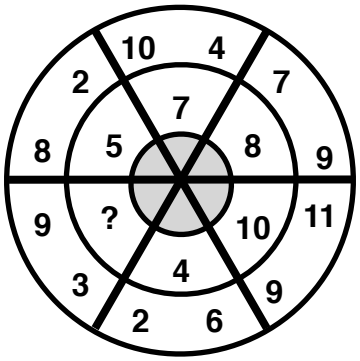

23. **What is the missing number?** _____
Hint: Averages.


24. **What is the missing number?** _____
**Hint:** Products, Sums.



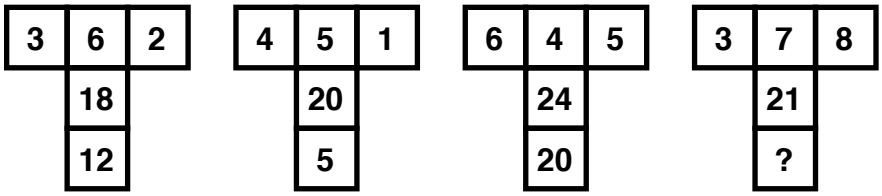
25. **What is the missing number?** _____

**Hint:** Averages.



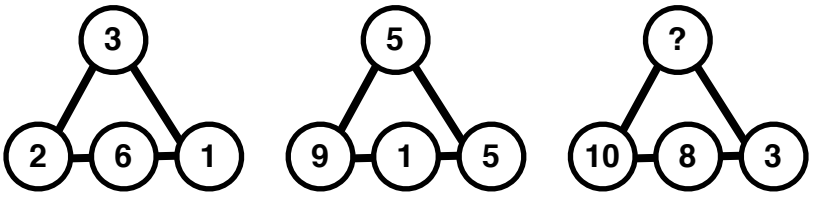

26. **What is the missing number?** _____

**Hint:** Products.



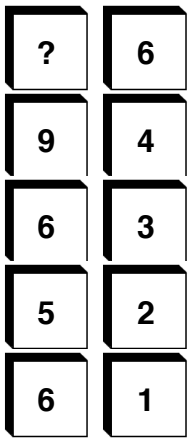

27. **What is the missing number?** _____

**Hint:** Averages.

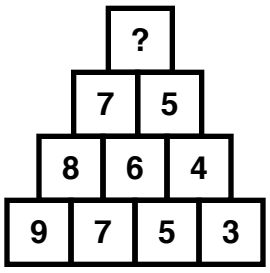



28. **What is the missing number?** _____

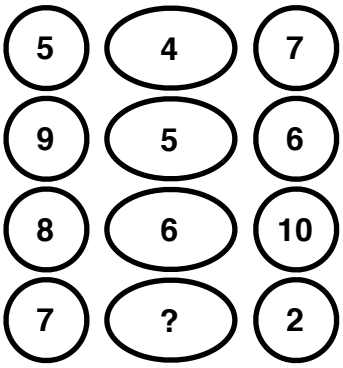
**Hint:** Squares.



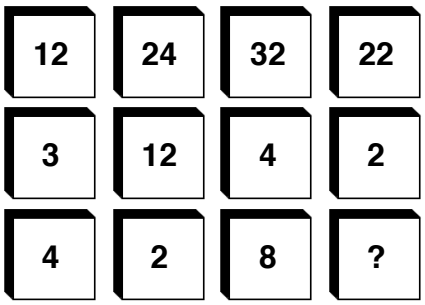
29. **What is the missing number?** _____
**Hint:** Averages.



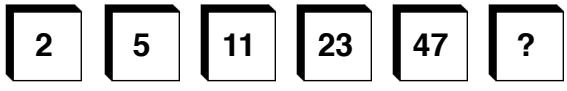

30. **What is the missing number?** _____
**Hint:** Sums , Division.



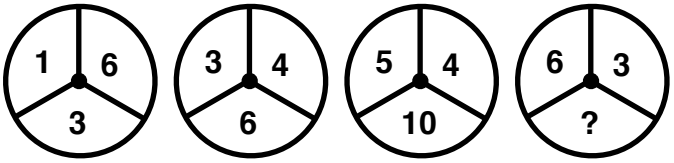

31. **What is the missing number?** _____
**Hint:** Products.



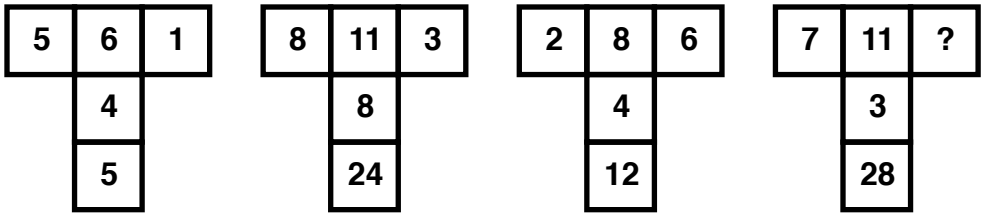

32. **What is the missing number?** _____
**Hint:** Double the numbers.



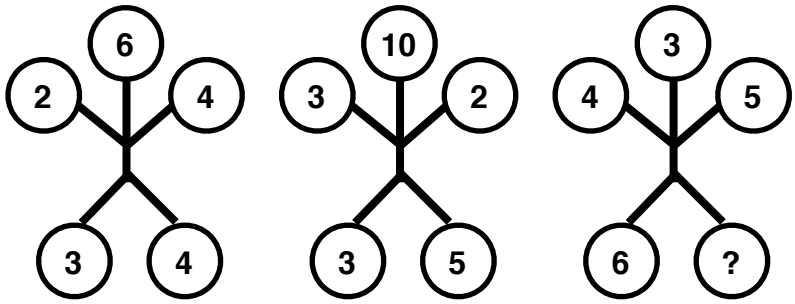
33. **What is the missing number?** _____
**Hint:** Products.



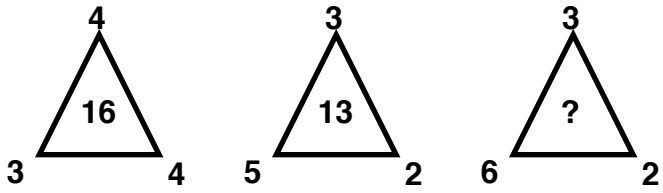

34. **What is the missing number?** _____
**Hint:** Products, Sums, Differences.




35. **What is the missing number?** _____
**Hint:** Products and Sums.




36. **What is the missing number?** _____
**Hint:** Products and Sums.

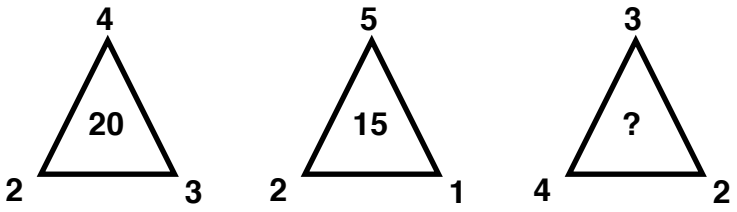


37. **What is the missing number?** _____

**Hint:** Multiply by 2.


38. **What is the missing number?** _____

**Hint:** Products and Sums.

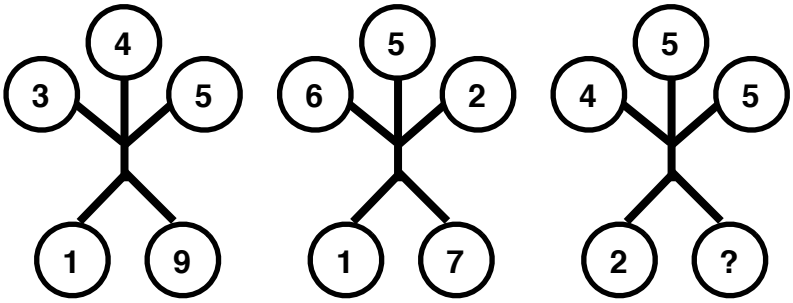



39. **What is the missing number?** _____

**Hint:** Multiples.

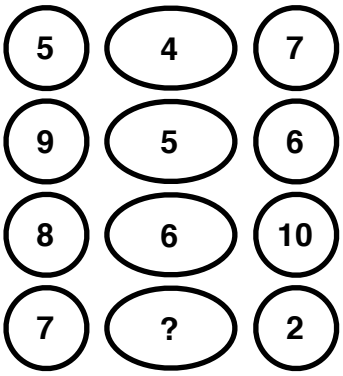

40. **What is the missing number?** _____

**Hint:** Products and Sums.



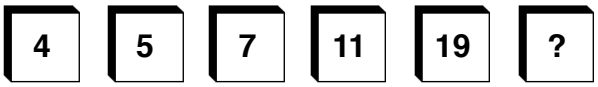
41. **What is the missing number?** _____

**Hint:** Sums , Division.



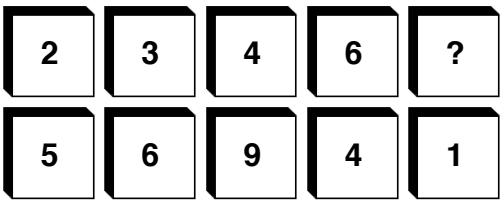

42. **What is the missing number?** _____

**Hint:** Double the numbers.



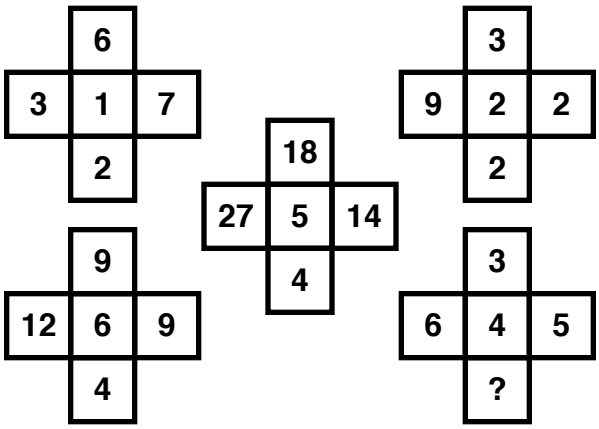

43. **What is the missing number?** _____

**Hint:** Squares.



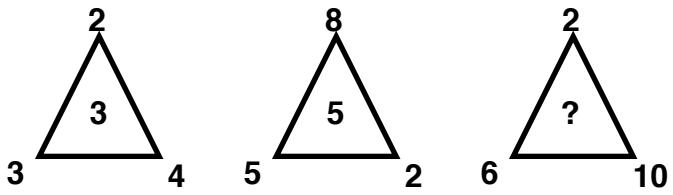

44. **What is the missing number?** _____

**Hint:** Products, Sums, Differences



45. **What is the missing number?** _____

**Hint:** Averages.




46. **What is the missing number?** _____

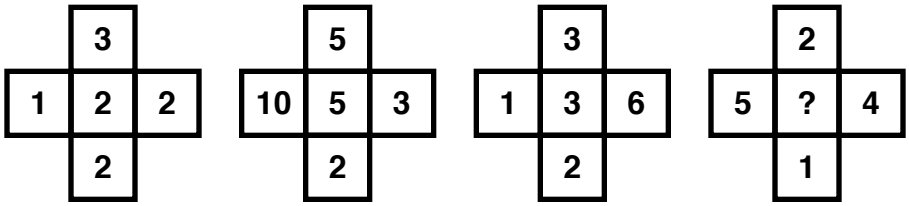
**Hint:** Products.

| | | | |
|---|---|---|---|
| 4 | 2 | 8 | 7 |
| 6 | 3 | 6 | 6 |
| 5 | 1 | 5 | 3 |

| | | | |
|---|---|---|---|
| 5 | 1 | 0 | 2 |
| 4 | 1 | 2 | 3 |
| 5 | 3 | ? | 6 |

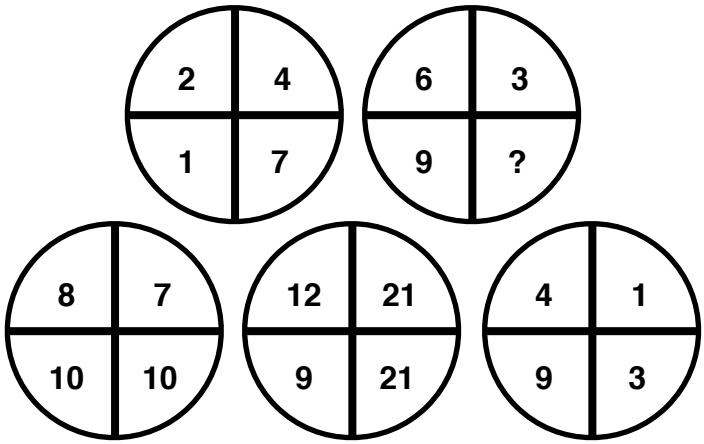
47. **What is the missing number?** _____

**Hint:** Averages.



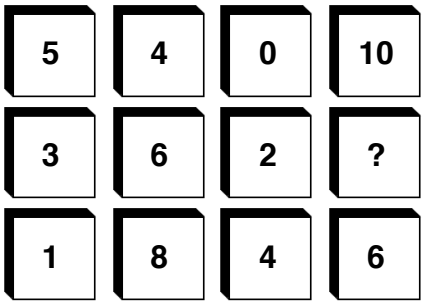

48. **What is the missing number?** _____

**Hint:** Products , Sums and Differences.



49. **What is the missing number?** _____

**Hint:** Averages.



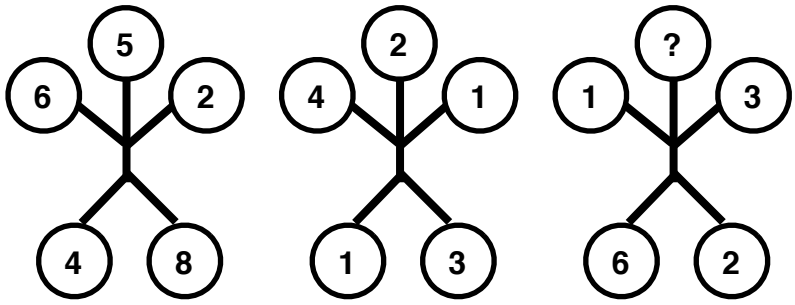

50. **What is the missing number?** _____

**Hint:** Double the number.

| | |
|---|---|
| 2 | 3 |
| 6 | 4 |
| 8 | 12 |
| 24 | ? |

51. **What is the missing number?** _____

**Hint:** Averages.



**Solutions: Products , Averages , Primes and Squares**

1. **Solution: 19.** The **prime numbers** starting at 5. 5, 7, 11, 13, 17, **19**
   **Hint:** Primes.

2. **Solution: 12.** Any 2 numbers connected by a line segment have a product of 36.
   **Hint:** Products.

3. **Solution: 5.** In each square, multiply the top and bottom numbers together to get a 2 digit result, then write this result in the left and right hand spaces.
**Hint:** Products.

4. **Solution: 36.** Starting at the middle left circle the numbers and moving clockwise the numbers are the first 6 **perfect squares.**
   **Hint:** Squares.

5. **Solution: 14.** Values in the right table contain the products of the 2 values in corresponding positions of the 2 left tables
**Hint:** Products.

6. **Solution: 3.** In each figure, the lower number equals the **average** of the top two numbers.
   **Hint:** Averages. $\frac{7+3}{2}=\frac{10}{2}=5$ , $\frac{6+8}{2}=\frac{14}{2}=7$ , $\frac{2+10}{2}=\frac{12}{2}=6$ , $\frac{4+2}{2}=\frac{6}{2}=3$

7. **Solution:** 20. All the numbers in the oval are Square Numbers except 20.
   **Hint:** Squares.

8. **Solution: 18.** Values in the right table contain the products of the 2 values in the corresponding positions of the 2 left tables.
**Hint:** Products.

9. **Solution: 4.** Values in the right circle contain the average of the 2 values in the corresponding positions of the 2 left circles.
**Hint:** Averages. $\frac{1+9}{2}=\frac{10}{2}=5$ , $\frac{3+11}{2}=\frac{14}{2}=7$ , $\frac{4+2}{2}=\frac{6}{2}=3$ , $\frac{6+2}{2}=\frac{8}{2}=4$

10. **Solution: 21.** Values in the middle table contain the products of the 2 values in corresponding positions of the left and right tables.
**Hint:** Products.

11. **Solution: 7.** In each column of the diagram, the central value equals the average of the upper and lower numbers.
**Hint:** Averages.

12 **Solution: 12.** All the numbers except 12 are Prime numbers.
**Hint:** Primes

13. **Solution: 3.** Values in the right circle contain the average of the 2 values in the corresponding positions of the 2 left circles.
**Hint:** Averages.

14. **Solution: 27.** The inner number in each segment equals the product of the two numbers in the outer part of the segment.
**Hint:** Products.

15. **Solution:** 7. The numbers at the top vertex of the triangle is the average of the two numbers at the bottom two vertex. **Hint:** Averages. $\frac{5+9}{2} = \frac{14}{2} = 7$

16. **Solution:** 0. In each row of each grid, multiply the left and right hand numbers together to give a 2 digit number, and write this number in the two center boxes.
**Hint:** Products.

17. **Solution: 18.** All the numbers in the oval are multiples of 8 except 18.
**Hint:** Multiples.

18. **Solution: 6.** The number in the bottom square is the average of the top 3 numbers.
**Hint:** Averages.

19. **Solution 23**. The next prime number after 19 is 23.
**Hint:** Averages.

20. **Solution: 5.** The diagram represents a multiplication problem : 128 x 2 = 256.
**Hint:** Products.

21. **Solution: 18.** All the numbers in the oval are multiples of 7 except 18.
**Hint:** Multiples.

22. **Solution: 69.** Double the first number in the left (2) and then subtract 1 to find the next number. Repeat this sequence.
**Hint:** Double the number.

23. **Solution: 9.** The center number is the average of the outer 3 numbers in each star.
**Hint:** Averages.

24. **Solution: 18.** Numbers in the corresponding segments of the bottom left hand circle equal the product of the numbers in corresponding segments of the top 2 circles. Numbers in the the corresponding segments of the bottom right hand circle equal the sum of the numbers in corresponding segments of the top two circles.
**Hint:** Products, Sums.

25. **Solution: 6.** The inner number in each segment is the average of the two numbers in the outer part of the segment.
**Hint:** Averages.

26. **Solution: 56.** In each diagram, multiply the left hand number by the upper central number to give the central number one line down, and multiply the right hand number by the upper central number to give the lower central number.
**Hint:** Products.

27. **Solution: 7.** The number at the top vertex is the average of the lower 3 numbers.
**Hint:** Averages.

28. **Solution: 4.** Working from the bottom bottom, each row is a square number with the digits reversed, from 4 squared to 8 squared.
**Hint:** Squares

29. **Solution: 6.** Numbers in boxes from the second row up equal the average of the 2 numbers in the boxes directly below. Continue to the top of the triangle
**Hint:** Averages.

30. **Solution: 3.** In each row, the number in the central oval equals the sum of the left and right hand numbers, divided by 3.
**Hint:** Sums , Division.

31. **Solution: 11.** The number at the top of each column is the product of the 2 numbers below it.
**Hint:** Product.

32. **Solution: 95.** Double the first number in the left (2) and then subtract 1 to give the next one. Repeat this sequence.
**Hint:** Double the numbers.

33. **Solution: 6.** The lower number in each circle is the product of the 2 upper numbers divided by 2.
**Hint:** Products.

34. **Solution: 4.** In each shape, use the left and right hand numbers as a source. The upper central number equals the sum of the left and right hand numbers, the middle central number equals the difference of the left and right hand numbers, and the lower central number equals the product of the left and right hand numbers.
**Hint:** Sums, Differences, Products

35. **Solution: 2.** The sum of the three upper numbers equals the product of the two lower numbers.
**Hint:** Sums and Products.

36. **Solution: 15.** In each triangle, multiply the lower two numbers together and add the upper number to give the value at the center.
**Hint:** Products, Sums.

37. **Solution: 110.** Starting on the left and moving right, double each number and add 2 to find the next number.
**Hint:** Double each number.

38 **Solution: 18.** In each triangle, add together the lower 2 digits, and multiply this by the top digit, to give the value written in the center of the triangle.
**Hint:** Sums and Products.

39. **Solution: 5.** Working from left to right and reading each pair of numbers as a 2 digit value, these values represent the sequence of multiples of 7, starting at 14 and ending at 35.
**Hint:** Multiples.

40. **Solution: 9.** In each diagram, multiply the 2 numbers on the "arms" together and add that product to the number at the very top to get a 2 digit result. Write that sum in the lower 2 spaces.
**Hint:** Products , Sums.

41. **Solution: 3.** Working in rows, the number in the central oval equals the sum of the left and right hand numbers, divided by 3.
**Hint:** Sums , Division.

42. **Solution: 19.** Moving from left to right starting at 4, double each number and subtract 3 to get the next number.
**Hint:** Double the numbers.

43. **Solution:** 8. Read each pair of vertical numbers in a column as a 2 digit number. They are the sequence of **square numbers** from 5 to 9. $5^2 = 25$ , $6^2 = 36$ , $7^2 = 49$ and $8^2 = 64$ $9^2 = 81$
**Hint:** Squares.

44. **Solution: 0.** Use the top two diagrams as a source. Numbers in corresponding positions in the lower left diagram equal the sums of the numbers in the top two diagrams, numbers in the central diagram equal their product, and numbers in the lower right diagram equal their difference.
**Hint:** Products, Sums, Differences

45. **Solution:** 6. The center number is the average of the 3 numbers at each vertex.
**Hint:** Averages

46. **Solution: 0.** In each row in each grid, multiply the left and right hand numbers together to get a 2 digit answer. Write this product in the two center boxes.
**Hint:** Products.

47. **Solution: 3.** In each group of squares , the center number equals the average of the four surrounding numbers.
**Hint:** Averages.

48. **Solution: 3.** Using the top two circles, the values in corresponding segments of the bottom left circle equal the sums of the numbers in the top two circles. The values in the bottom center circle equal the products of the values in the top two circles, and the bottom right circle equals the difference between values in the top two circles.
**Hint:** Sums, Difference, Products.

49. **Solution: 8.** In each column of the diagram, the central value equals the average of the upper and lower numbers.
**Hint:** Averages.

50. **Solution: 16.** Starting with the top left number, and working down one row at a time, alternating between left and right, double the number each time. Repeat this sequence, starting with the top right number.
**Hint:** Double the number.

51. **Solution: 4.** The number at the top equals the average of the four numbers below it.
**Hint:** Average