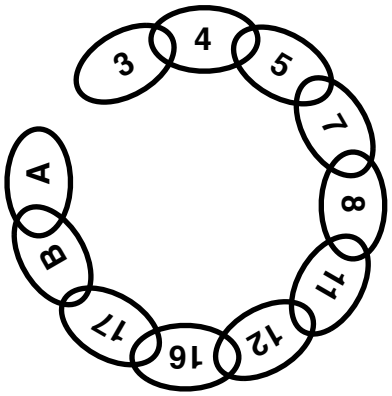
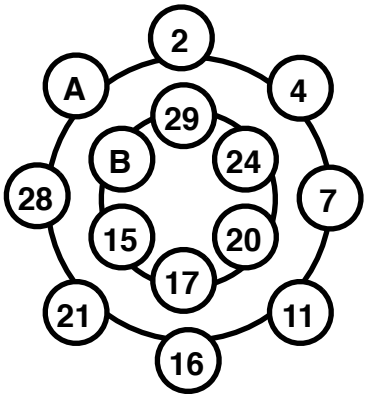
What is the missing number?

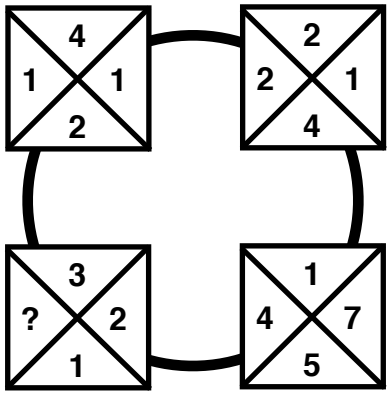
A Pattern Recognition Activity

Sequences



Julie Eitel





Introduction

What is the missing number?

Find the pattern that was used to complete part of the figure and then use that same pattern to find the missing number that the **?** sign represents.

Adding the same number to successive numbers.

A common pattern used to create a sequence is to start with a number in the 1st position. You then add a given number to the 1st number to get the 2nd number. Then add the same number to the 2nd number to get the 3rd number. Then add the same number to the 3rd number to get the 4th number. Continue this pattern as long as you like.

Example 1

Find the value for missing number represented by ?

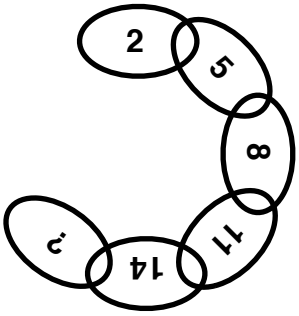
5 + 2 = 7 , 7 + 2 = 9 , 9 + 2 = 11 , 11 + 2 = 13

Pattern: Start at the left circle with the number 5. Add 2 to the 5 to get 7 and place the 7 in the 2nd circle. Then add 2 to the 7 to get 9 and place the 9 in the 3rd circle. Then add 2 to the 9 to get 11 and place the 11 in the 4th circle. Then add 2 to the 11 to get 13 and place the 13 in the 5th circle.

Solution: 13 in the missing number.

Example 2

Find the value for missing number represented by ?



2 + 3 = 5 , 5 + 3 = 8 , 8 + 3 = 11 , 11 + 3 = 14 , 14 + 3 = 17

Pattern: Start at the top link in the chain with the number 2. Add a 3 to the 2 to get 5 and place the 5 in the 2nd link. Then add 3 to the 5 to get 8 and place the 8 in the 3rd link. Then add 3 to the 8 to get 11 and place the 11 in the 4th link. Then add 3 to the 11 to get 14 and place the 14 in the 5th link. Then add 3 to the 14 to get 17 and place the 17 in the 5th link.

Solution: 17 in the missing number.

Adding 1 and then 2 and then 3 and then 4 and then 5 to successive numbers.

A common pattern used to make a sequence is to start with a number in the 1st position. You then add a 1 to the 1st number to get the 2nd number. Then add 2 to the 2nd number to get the 3rd number. Then add 3 to the 3rd number to get the 4th number. Then add 4 to the 4th number to get the 5th number. Then add 5 to the 4th number to get the 5th number. Continue this pattern as long as you like.

Example 1

Find the value for missing number represented by ?

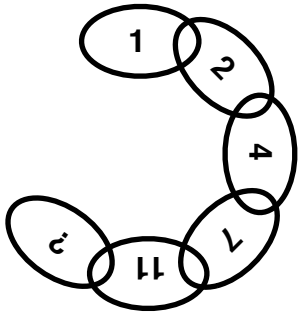
5 **+ 1** = 6 , 6 **+ 2** = 8 , 8 **+ 3** = 11 , 11 **+ 4** = 15

Pattern: Start at the left figure with the number 5. **Add 1** to the 5 to get 6 and place the 6 in the 2nd circle. Then **add 2** to the 6 to get 8 and place the 8 in the 3rd circle. Then **add 3** to the 8 to get 11 and place the 11 in the 4th circle. Then **add 4** to the 11 to get 15 and place the 15 in the 5th circle.

Solution: 15 in the missing number.

Example 2

Find the value for missing number represented by ?



1 **+ 1** = 2 , 2 **+ 2** = 4 , 4 **+ 3** = 7 , 7 **+ 4** = 11 , 11 **+ 5** = 16

Pattern: Start at the left figure with the number 1. **Add 1** to the 1 to get 2 and place the 2 in the 2nd circle. Then **add 2** to the 2 to get 4 and place the 4 in the 3rd circle. Then **add 3** to the 4 to get 7 and place the 7 in the 4th circle. Then **add 4** to the 7 to get 11 and place the 11 in the 5th circle. Then **add 5** to the 11 to get 16 and place the 16 in the 5th circle.

Solution: 16 in the missing number.

Subtracting the same number to successive numbers.

A common pattern used to make a sequence is to start with a number in the 1st position. You then **subtract** a given number to the 1st number to get the 2nd number. Then **subtract** the same number to the 2nd number to get the 3rd number. Then **subtract** the same number to the 3rd number to get the 4th number. Continue this pattern as long as you like.

Example

Find the value for missing number represented by ?

11 **– 2** = 9 , 9 **– 2** = 7 , 7 **– 2** = 5 , 5 **– 2** = 3

Pattern: Start at the left circle with the number 11. **Subtract** 2 from the 11 to get 7 and place the 7in the 2nd circle. Then **Subtract** 2 from the 9 to get 7 and place the 7 in the 3rd circle. Then **Subtract** 2 from the 7 to get 5 and place the 5 in the 4th circle. Then **Subtract** 2 from the 5 to get 3 and place the 3 in the 5th circle.

Solution: 3 in the missing number.

Subtracting 1 and then 2 and then 3 and then 4 and then 5 to successive numbers.

A common pattern used to make a sequence is to start with a number in the 1st position. You then **subtract** a 1 to the 1st number to get the 2nd number. Then **add** 2 to the 2nd number to get the 3rd number. Then **add** 3 to the 3rd number to get the 4th number. Then **add** 4 to the 4th number to get the 5th number. Then **add** 5 to the 4th number to get the 5th number. Continue this pattern as long as you like.

Example

Find the value for missing number represented by ?

15 **– 1** = 14 , 14 **– 2** = 12 , 12 **– 3** = 9 , 9 **– 4** = 5

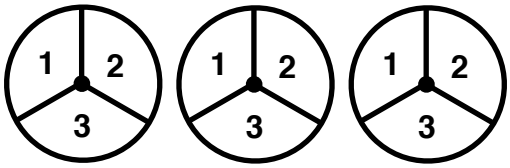
Pattern: Start at the left figure with the number 5. **Subtract 1** from the 15 to get 14 and place the 14 in the 2nd circle. Then **subtract 2** from the 14 to get 12 and place the 12 in the 3rd circle. Then **subtract 3** from the 12 to get 9 and place the 9 in the 4th circle. Then **subtract 4** from the 9 to get 5 and place he 15 in the 5th circle.

Solution: 5 in the missing number.

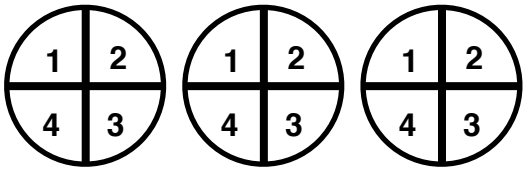
Corresponding Positions.

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

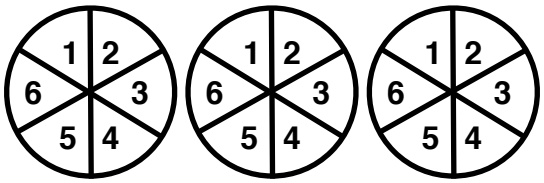
The 1 ‘s are in Corresponding Positions in each of the 3 circles. So are the 2 and 3’s.



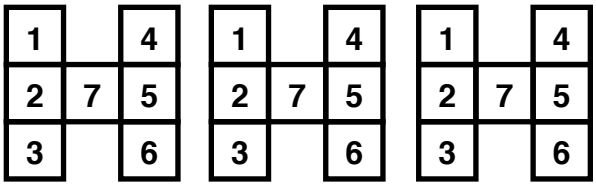
The 1 ‘s are in Corresponding Positions in each of the 3 circles. So are the 2, 3 and 4’s



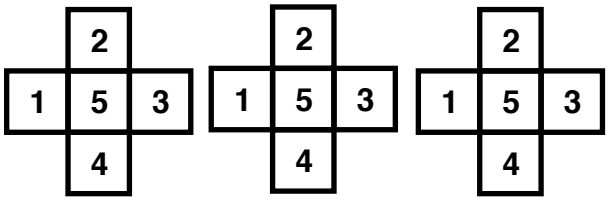
The 1 ‘s are in Corresponding Positions in each of the 3 circles So are the 2 ,3 , 4 , 5 and 6’s.



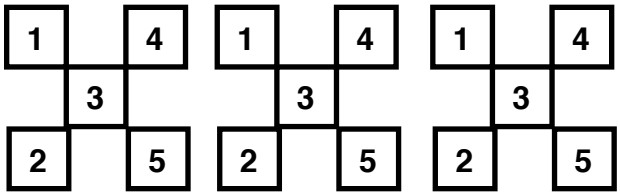
The 1 ‘s are in Corresponding Positions in each of the 3 figures So are the 2 ,3 , 4 , 5 , 6 and 7’s.



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

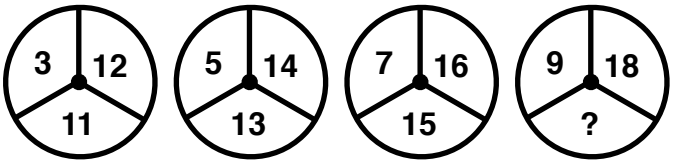


The 1 ‘s are in Corresponding Positions in each of the 3 figures So are the 2 ,3 , 4 , 5 , 6 and 7’s.



Adding a number to Corresponding Positions in successive figures.

Find the value for missing number represented by ?



11+ 2 = 13 , 13 + 2 = 15 , 15 + 2 = 17

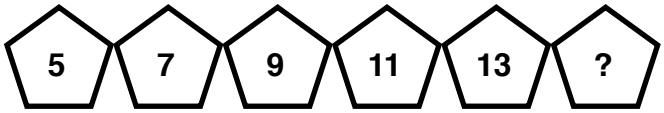
Pattern: Starting at the left circle, add a 2 to the number in the corresponding position in the 2nd circle and then add 2 to the number in the corresponding position in the 3rd circle and then add a 2 to the number in the corresponding position in the 4th circle.

Solution: 17 is the missing number.

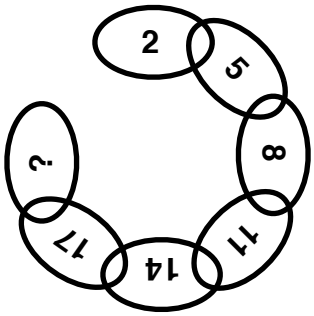
What is the missing number? **Name**_____

Sequences

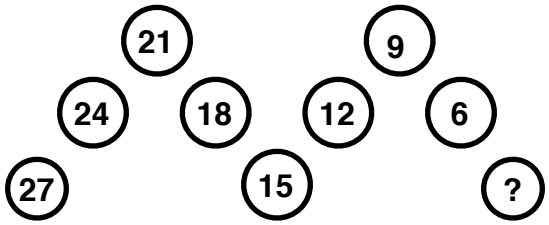
1. **What is the missing number?** _____



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

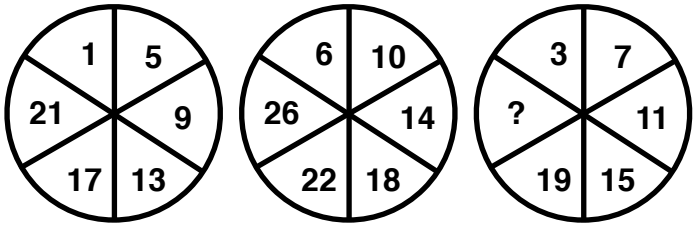


3. **What is the missing number?** _____

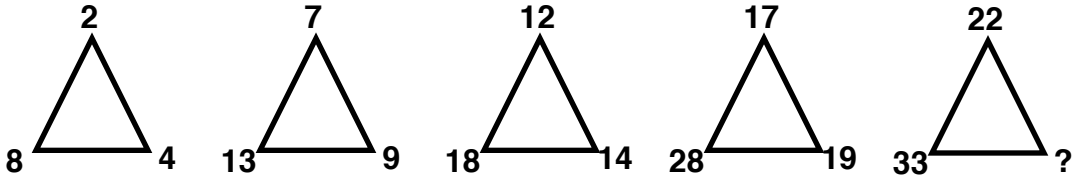


4. **What is the missing number?** _____

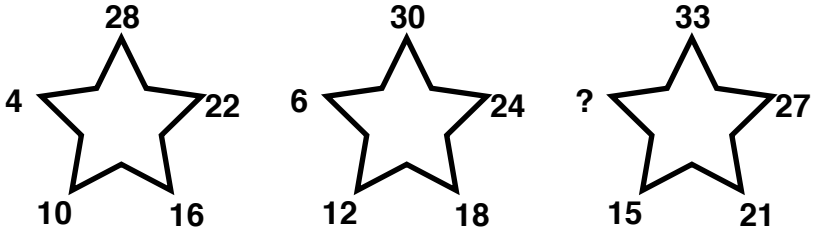
5. **What is the missing number?** _____



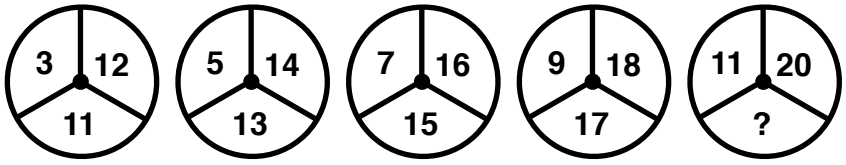
6. **What is the missing number?** _____



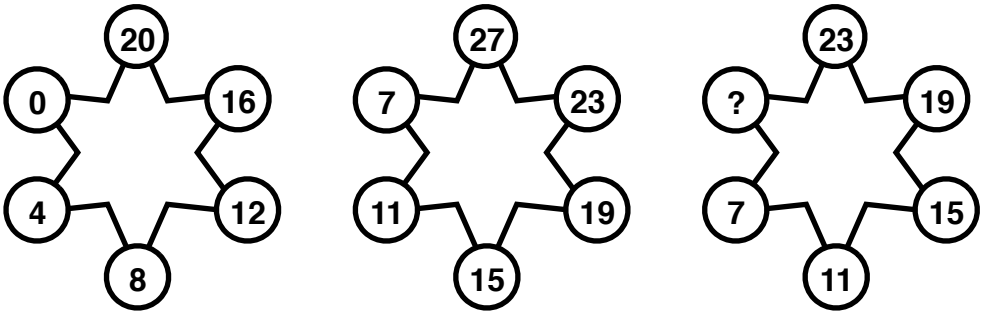
7. **What is the missing number?** _____



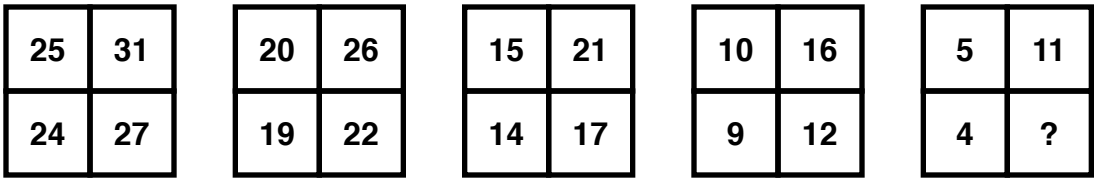
8. **What is the missing number?** _____



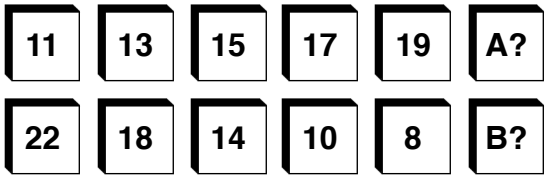
9. **What is the missing number? _____**



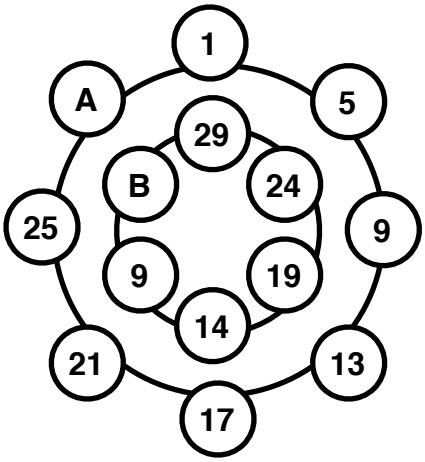
10. **What is the missing number? _____**



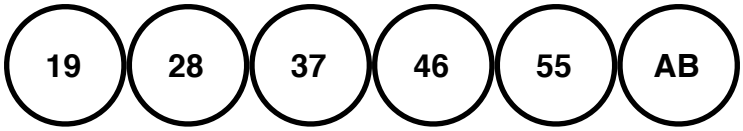
11. **What are the 2 missing numbers? A. ____ B. ____**



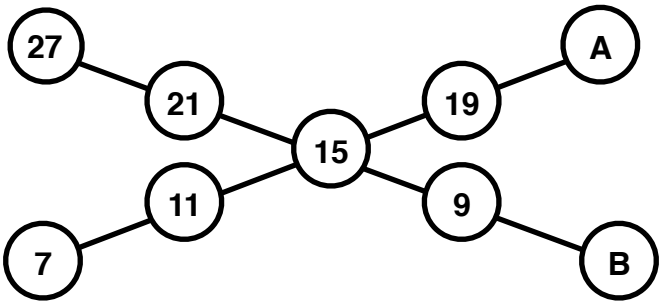
12. **What are the 2 missing numbers? A. ____ B. ____**



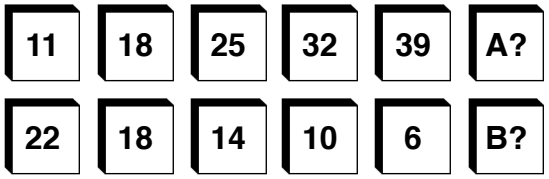
13. What are the 2 missing numbers? A. ____ B. ____



14. **What are the 2 missing numbers? A. ____ B. ____**



15. **What are the 2 missing numbers? A. ____ B. ____**



16. **What are the 2 missing numbers? A. ____ B. ____**

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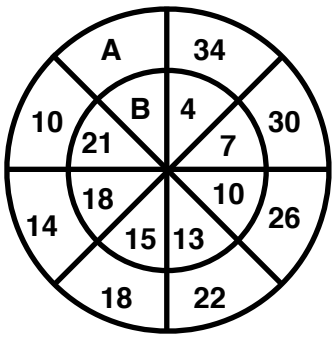
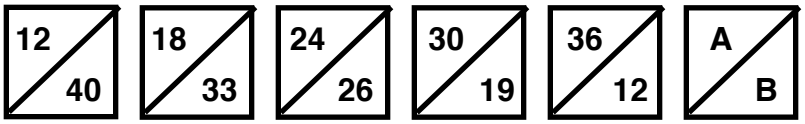
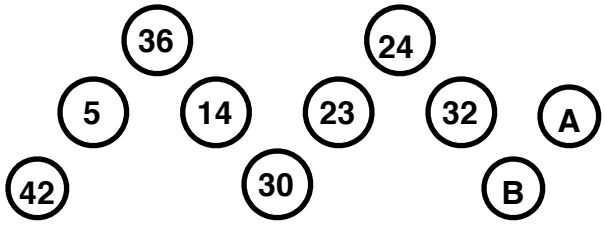


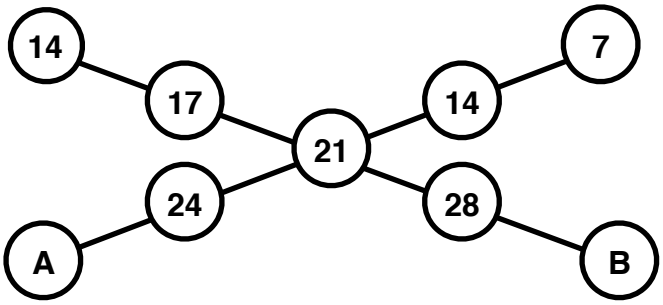
17. **What are the 2 missing numbers? A. ____ B. ____**



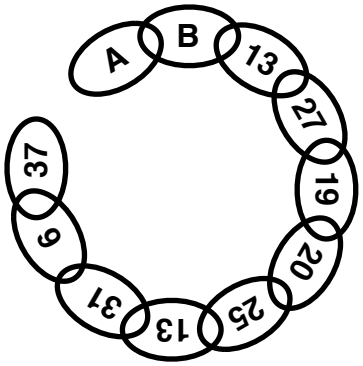
18. **What are the 2 missing numbers? A. ____ B. ____**



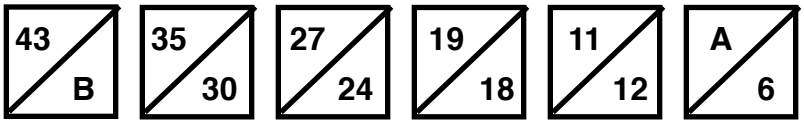
19. **What are the 2 missing numbers? A. ____ B. _____**



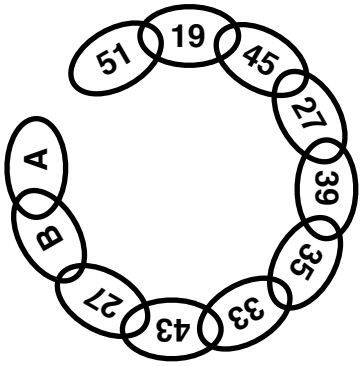
20. **What are the 2 missing numbers? A. ____ B. _____**



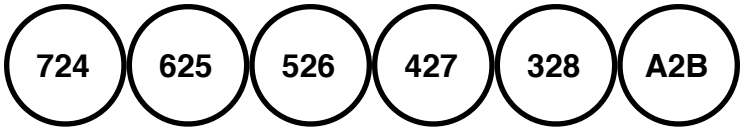
21. **What are the 2 missing numbers? A. ____ B. _____**



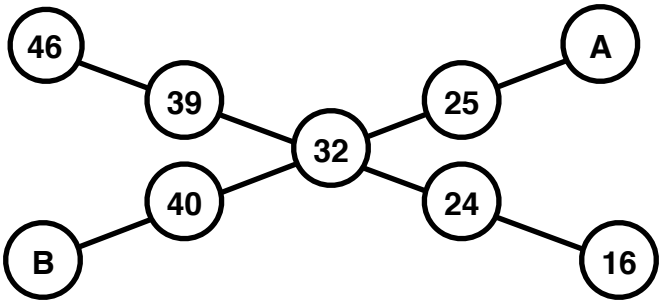
22. **What are the 2 missing numbers? A. ____ B. ____**



23. **What are the 2 missing numbers? A. ____ B.**

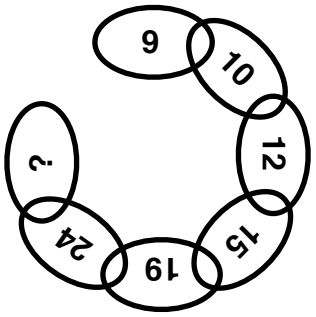


24. **What are the 2 missing numbers? A. ____ B. ____**

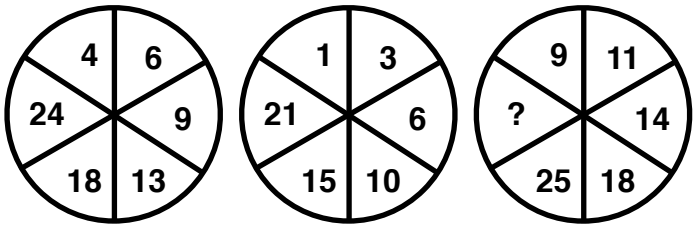


25. **What is the missing number?** _____

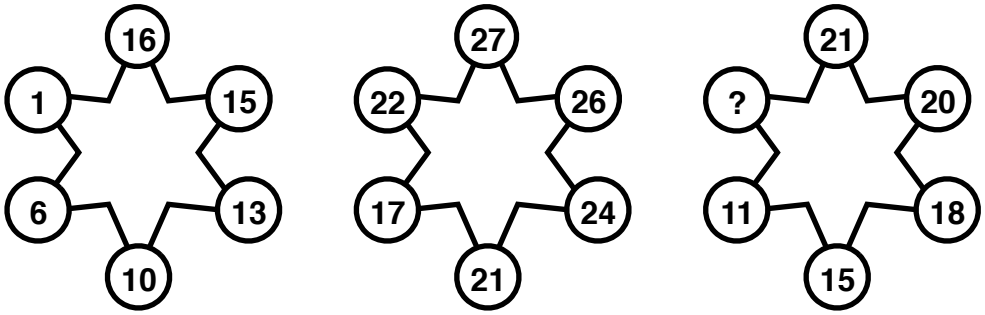
26. **What is the missing number?** _____



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

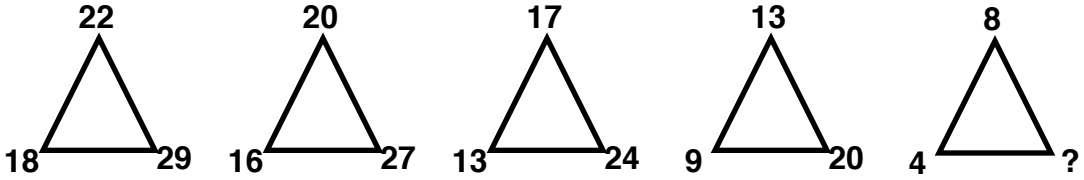


28. **What is the missing number?** _____

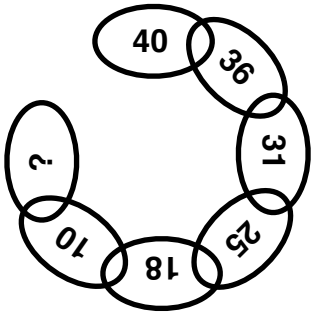


29. **What is the missing number?** _____

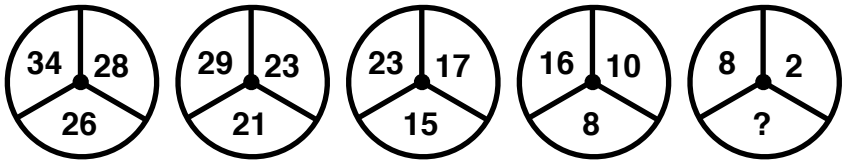
30. **What is the missing number?** _____



31. **What is the missing number?** ____



32. **What is the missing number?** ____



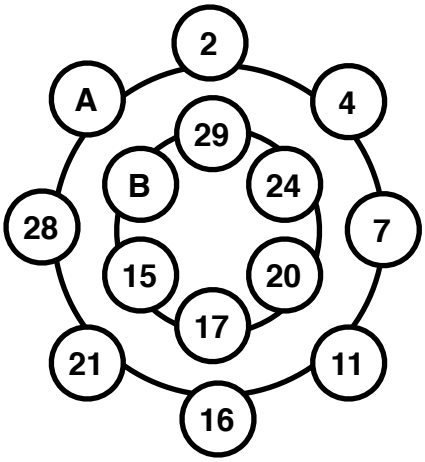
33. What is the missing number? ____

1	2	2	3	3	3
8	2	6	0	4	?

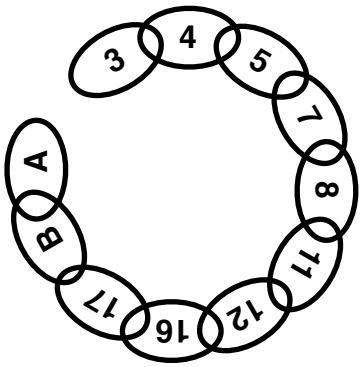
34. **What are the 2 missing numbers? A. ____ B. ____**

28	25	21	16	10	A?
12	15	18	21	24	B?

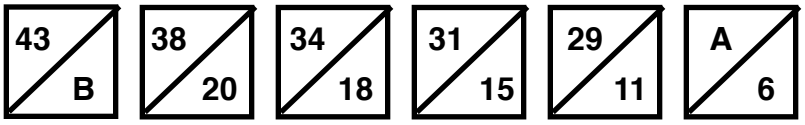
35. **What are the 2 missing numbers? A. ____ B. ____**



36. **What are the 2 missing numbers? A. ____ B. ____**



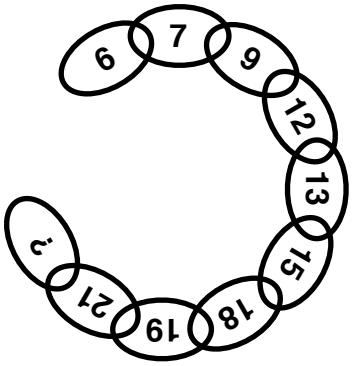
37. **What are the 2 missing numbers? A. ____ B. _____**



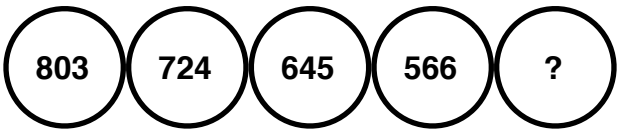
38. **What is the missing number? _____**

3	5
4	1
4	7
5	3
5	?

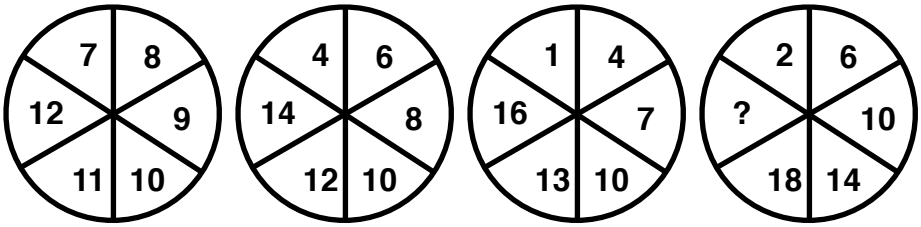
39. **What is the missing number? _____**



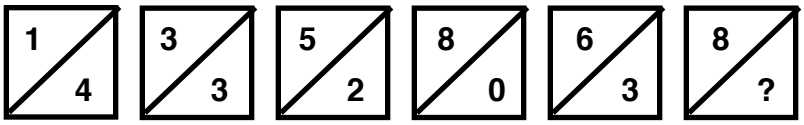
40. **What is the missing number? _____**



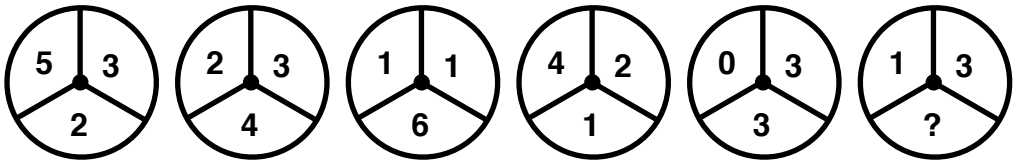
41. **What is the missing number?** _____



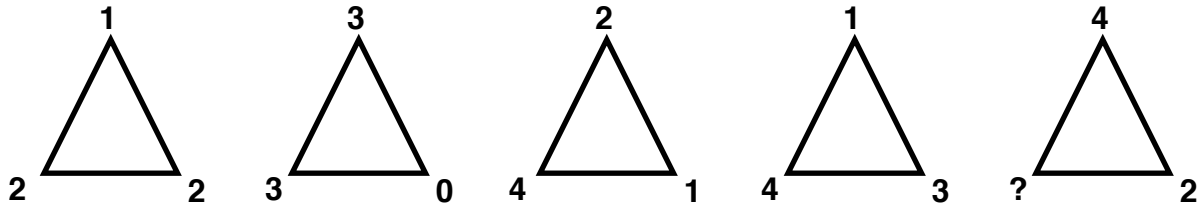
42. **What is the missing number?** _____
Hint: Sums.



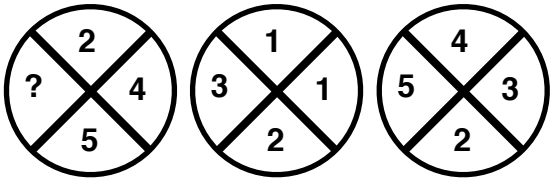
43. **What is the missing number?** _____
Hint: Sums.



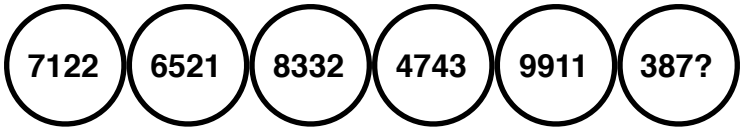
44. **What is the missing number?** _____
Hint: Sums.



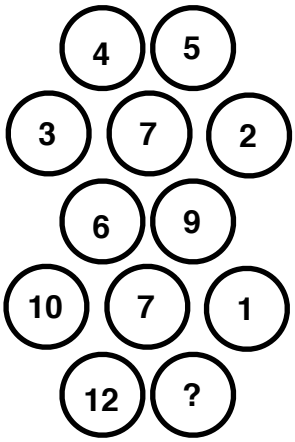
45. **What is the missing number?** _____
Hint: Sums.



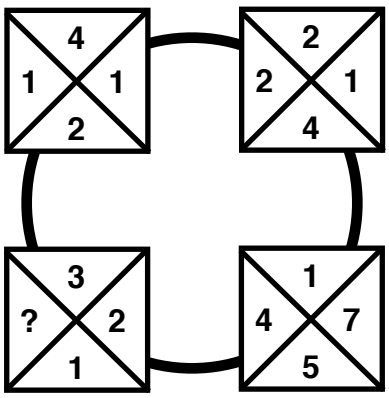
46. **What is the missing number?** _____
Hint: Sums.



47. **What is the missing number?** _____
Hint: Sums.

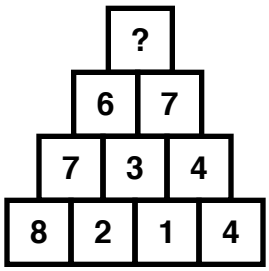


48. **What is the missing number?** _____
Hint: Sums.



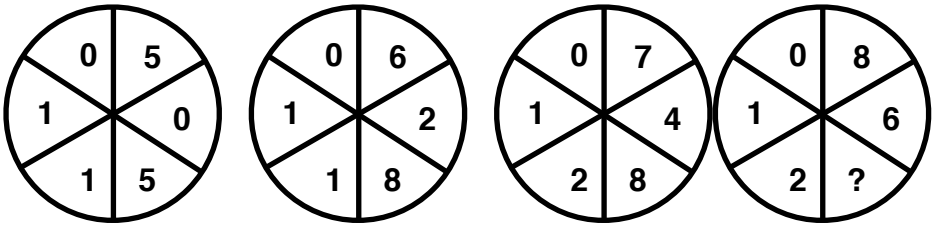
49. **What is the missing number?** _____

Hint: Sequence, Sums.



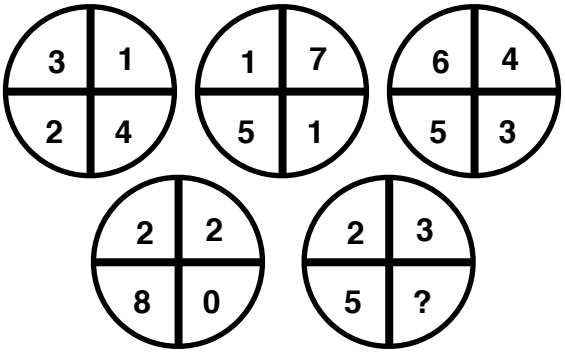
50. **What is the missing number?** _____

Hint: Sequence, Multiples.



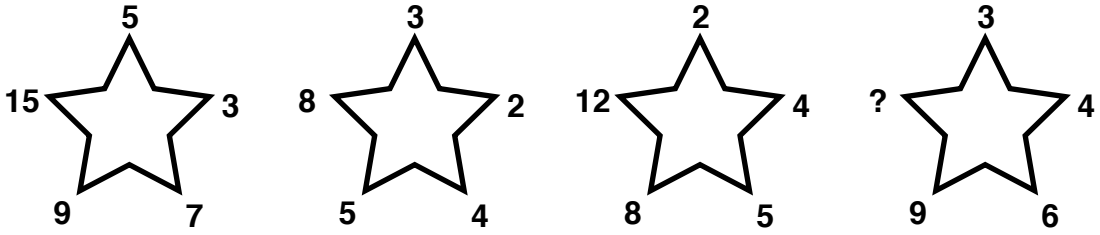
51. **What is the missing number?** _____

Hint: Sequence, Sums.



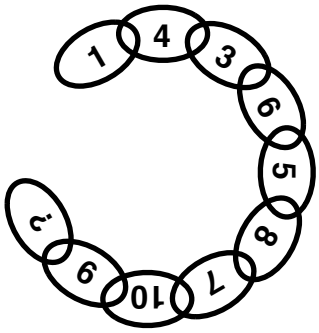
52. What is the missing number? _____

Hint: Sequence, Sums, Difference



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

Hint: Sequence, Sums, Differences.



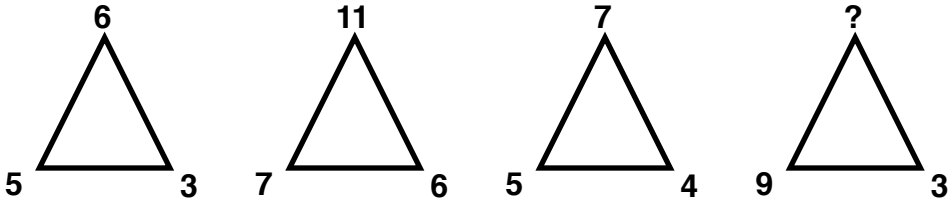
54. **What is the missing number?** _____

Hint: Sequence, Sums.

3	5	3
2	4	7
8	4	3
6	2	9
2	9	?

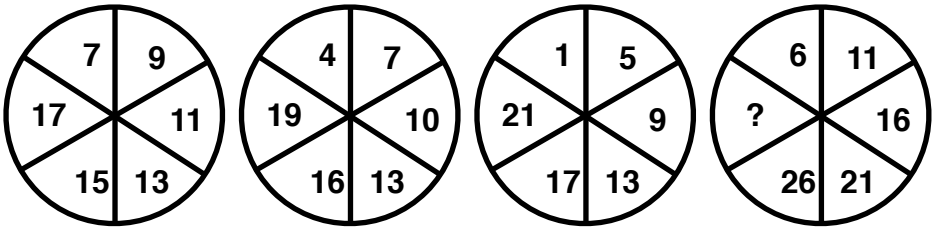
55. **What is the missing number?** _____

Hint: Sequence, Sums, Differences.



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

Hint: Sequence, Sums.



Sequence Solutions

1. **Solution:** 15. Starting with 5 , the numbers from left to right increase by 2 each time.
   Hint: Sequence , Add.

2. **Solution:** 20. Starting with 2 and moving clockwise, the numbers increase by 3 each time.
   Hint: Sequence , Add.

3. **Solution:** 3. Starting with 27 and moving right along the figure, numbers decrease by 3.
   Hint: Sequence , Subtract.

4. **Solution:** 8. Starting with 32, the numbers from left to right decrease by 4 each time.
   Hint: Sequence , Subtract.

5. **Solution: 23.** Moving clockwise from the lowest number in each circle the numbers increase by 4.
   Hint: Sequence , Add.

6. **Solution: 24.** From left to right, the numbers in the corresponding vertex of each triangle increase by 5.
   Hint: Sequence , Subtract.

7. **Solution: 9.** Moving clockwise from the top number in the vertex of each star, the numbers decrease by 6.
Hint: Sequence , Subtract.

8. **Solution: 19.** Moving from left to right, the numbers in the corresponding positions in each circle increase by 2.
Hint: Sequence , Add.

9. **Solution: 3.** In each star, moving clockwise from the largest number, the numbers decrease by 4.
Hint: Sequence , Subtract.

10. **Solution: 7.** Moving left to right, the numbers in the corresponding positions in each square decrease by 5.
Hint: Sequence , Add.

11. **Solution:** There are two sequences in the figure.
   A: 21. Starting on the left number of top row every the numbers increases by 2.
   B: 4. Starting on the left number of bottom row the numbers decreases by 4.

12. **Solution:** There are two sequences in the figure.
   A: 29. Starting with the top number in the outside circle the numbers increase by 4.
   B: 4. Starting with the top number in the inside circle the numbers decrease by 5.

13. **Solution:** There are two sequences in the figure.
A: 6. Starting with the 2 digit number 19 in the left circle and moving right, the tens digit increases by 1 each time.
B: 4. Starting with the 2 digit number 19 in the left circle and moving right, the ones digit decreases by 1 each time.

14. **Solution:** There are two sequences in the figure.
A: 23. Starting with the bottom left number the numbers on the diagonal increase by 4.
B: 3. Starting with the top left number the numbers on the diagonal decrease by 6.

15. **Solution:** There are two sequences in the figure.
A: 46. Starting on the left number of top row the numbers increase by 7.
B: 2. Starting on the left number of bottom row the numbers decrease by 4.

16. **Solution:** There are two sequences in the figure.
A: 6. Starting with the largest number in the outside circle the numbers decrease by 4.
B: 24. Starting with the smallest number in the inside circle the numbers increase by 3.

17. **Solution:** There are two sequences in the figure.
A: 43. Starting with the top number in the left square the corresponding numbers in each square increase by 6.
B: 5. Starting with the bottom number in the left square the corresponding numbers in each square decrease by 7.

18. **Solution:** There are two sequences in the figure.
A: 41. Starting at the second circle on the left (5) and moving along the horizontal row the numbers increase by 7. The sequence 5, 14, 23, 32 increases by 7.
B: 18. Starting at the bottom left circle (42) the numbers in every other circle decrease by 6. The sequence 42, 36, 30, 24, decreases by 6.

19. **Solution:** There are two sequences in the figure.
A: 27. Starting at the top left circle and moving along the left V shape the numbers increase by 3. The sequence 15, 18, 21, 24, A increases by 3.
B: 35. Starting at the top right circle and moving along the right V shape the numbers increase by 5. The sequence 7, 14, 21, 28, B increases by 7.

20. **Solution:** There are two sequences in the figure.
A: 7. Starting at the first segment on the bottom left segment of the chain and moving counterclockwise around the chain every other number decreases by 6.
B: 34. Starting at the second segment on the bottom left segment of the chain and moving counterclockwise around the chain every other number increases by 7.

21. **Solution:** There are two sequences in the figure.
A: 3. Starting with the top number in the left square and moving right the corresponding numbers in each square decrease by 8.
B: 36. Starting with the bottom number in the right square and moving left the corresponding numbers in each square increase by 6.

22. **Solution:** There are two sequences in the figure.
A: 21. Starting at the first segment on the top left segment of the chain and moving clockwise around the chain every other number decreases by 6.
B: 51. Starting at the second segment on the top left segment of the chain and moving clockwise around the chain every other number increases by 8.

23. Solution: 229.
A: 2. Starting with the 3 digit number 724 in the left circle and moving right, the 100's digit decreases by 1 each time.
B: 9. The one's digit increases by 1 each time. The 10's digit stays 2.

24. **Solution:** There are two sequences in the figure.
A: 18. Starting at the top left circle and moving along the top V shape the numbers decrease by 7. The sequence 46, 39, 32, 25, A decreases by 7.
B: 48. Starting at the bottom right circle and moving along the lower V shape the numbers increase by 8. The sequence 16, 24, 32, 40 B increases by 6.

25. **Solution: 26.** Start with the first number on the left (5). The next number to the right increases by 1, the next number after that increases by 2. the next number after that increases by 3, the next number after that increases by 4 and the next number after that increases by 5 and the next number after that increases by 6. As you move left to right the numbers in crease by 1 and then 2 and then 3 and then 4 and then 5 and then 6.

26. **Solution: 30.** Start with the first number at the top of the chain (9). As you move clockwise the next number increases by 1, the next number after that increases by 2. the next number after that increases by 3, the next number after that increases by 4 and the next number after that increases by 5. As you move clockwise the numbers in crease by 1 and then 2 and then 3 and then 4 and then 5 and then 6.

27. **Solution: 31.** Start with the smallest number in the circle on the left. As you move clockwise around that circle the next number increases by 2, the next number after that increases by 3 and the next number after that increases by 4, the next number after that increases by 5 and the next number after that increases by 6.

28. **Solution: 6.** Start with the largest number in the star on the left. As you move clockwise on the star the next number to the right decreases by 1, the next number after that decreases by 2 and the next number after that decreases by 3, the next number after that decreases by 4 and the next number after that decreases by 5.

29. **Solution: 3.** Start with the number in the square on the left. As you to the right the next number in the square to the right decreases by 1, the next number after that decreases by 2 and the next number after that decreases by 3, the next number after that decreases by 4 and the next number after that decreases by 5.

30. **Solution: 15.** Start with the number on the vertex at the top of the triangle on the left. As you move form left to right the numbers of the vertex of the triangles decrease by 2 and then 2 and then 3 and then 4 and then 5.

31. **Solution: 1.** Start with the first number at the top of the chain (40). As you move clockwise the next number decreases by 4, the next number after that decreases by 5. the next number after that decreases by 6, the next number after that decreases by 7 and the next number after that decreases by 8 and the next number after that decreases by 9.

32. **Solution: 0.** Start with the number in the top left segment of the right circle (34). Moving from left to right, the numbers in the corresponding positions in each circle decrease by 5, the next number after that decreases by 6. the next number after that decreases by 7, the next number after that decreases by 8.

33. **Solution: 8.** The first column is a 2 digit number. Add 4 and write the total in the 2 squares to the right.

34**.** Solution: There are two sequences in the figure.

A: 3. Starting at the left number of top row the numbers decrease by 3 and then 4 and then 5 and then 6 and then 7.

B: 27. Starting at the left number of bottom row the numbers increases by 3.

35. **Solution:** There are two sequences in the figure.

A: 36. Starting with the top number in the outside circle the numbers increase by 2 and then 3 and then 4 and then 5 and then 6 and then 7.

B: 14. Starting with the top number in the inside circle the numbers decrease by 5 and then 4 and then 3 and then 2 and then 1.

36. **Solution:** There are two sequences in the figure.

A: 23. Starting with the first number at the top of the chain and moving clockwise every other number increases by 2 and then 3 and then 4 and then 5 and then 6.

B: 22. Starting with the second number at the top of the chain and moving clockwise every other number increases by 3 and then 4 and then 5 and then 6.

37. **Solution:** There are two sequences in the figure.

A: 28. Starting with the top number in the left square the corresponding numbers in each square decreases by 5 and then 4 and then 3 and then 2 and then 1.

B: 19. Starting with the bottom number in the right square the corresponding numbers in each square increases by 5 and then 4 and then 3 and then 2 and then 1.

38. **Solution: 9.** Reading each pair of numbers in a row as a 2 digit number, values increase by 6 each time.

39. **Solution: 24.** Starting at the top left link in the chain and moving clockwise around the chain, numbers increase by 1, then 2, then 3, before repeating this pattern.

40. **Solution:** 487. Starting with the top 3 digit number and moving left, the first digit decreases by 1 each time, the middle digit increases by 2 each time, and the right hand digit increases by 1 each time.

41. **Solution: 22**. In each circle, starting at the left circles top left segment, numbers increase, by 1 as you move clockwise around the first circle, by 2 as you move around the second circle, by 3 as you move around the third circle, and by 4 as you move around the 4th circle.

42. **Solution:** 2. The sum of the digits in the first square is 5. The sum of the digits in the second square is 6. The sum of the digits in the third square is 7. The sum of the digits in the 4th square is 8. The sum of the digits in the 5th square is 9. The sum of the digits in the 5th square is 10. The sum of the digits in the 5th circle is 5. The sums of the numbers in each square increase by 1 from left to right.
Hint: Sums.

43. **Solution:** 1. The sum of the digits in the first circle is 10. The sum of the digits in the second circle is 9. The sum of the digits in the third circle is 8. The sum of the digits in the 4th circle is 7. The sum of the digits in the 5th circle is 6. The sum of the digits in the 5th circle is 5. The sums of the numbers in each circle decrease by 1 from left to right.
Hint: Sums.

44. **Solution: 3.** The sum of the numbers at the 3 vertex of the 1st triangle on the left is 5. The sum of the numbers at the 3 vertex of the 2nd triangle on the left is 6. The sum of the numbers at the 3 vertex of the 3rd triangle on the left is 6. The sums of the 3 vertex in triangle circle decrease by 1 from left to right.
Hint: Sums.

45. **Solution: 2.** The sum of the digits in the corresponding top 4 segments of the 4 circles is 7. The sum of the digits in the 4 corresponding right segments of the 4 circles is 8. The sum of the digits in the corresponding 4 bottom segments of the circles is 9. The sum of the digits in the corresponding 4 left segments of the circles is 10.

? + 3 + 5 = 10 so ? + 8 = 10 so ? = 2

46. **Solution: 4.** As you move from the left circle to the right the sums of the digits in each circle have totals that increase by 2 each time, from 12 to 22.
Hint: Sequence and Sums.

47. **Solution: 9.** The sum of numbers in each row increase by 2 as you go down the rows. The sums follow the sequence 9, 12, 15, 18, 21.
Hint: Sums.

48. **Solution: 6.** The sum of the digits in the corresponding top 4 segments of the squares is 10. The sum of the digits in the 4 corresponding right segments of the squares is 11. The sum of the digits in the corresponding 4 bottom segments of the squares is 12. The sum of the digits in the corresponding 4 left segments of the squares is 13.

49. **Solution: 12.** Working from the bottom row to the top of the triangle, the sum of the values in each row follows the sequence 15, 14, 13,12.
Hint: Sequence, Sums.

50. **Solution: 4.** Split the circle in half vertically, and take pairs of digits from corresponding segments of the left and right hand halves of the circle. Reading these pairs of digits as 2 digit numbers, these numbers follow the sequence of multiples of 5, multiples of 6, multiples of 7 and multiples of 8.
Hint: Sequence, Multiples.

51. **Solution: 1.** Start with the top left circle, and move around the others in a W shape. The sum of the numbers in each circle follows the sequence of 10, 12, 14, 16 and 18.
Hint: Sequence , Sums.

52. **Solution: 14.** Start at the top of each triangle and move clockwise around its points. Add the first two numbers together and subtract 1 to give the next number. Continue this pattern.
Hint: Sequence, Sums, Difference

53. **Solution: 23.** Starting on the top left link of the chain, and moving clockwise numbers increase by 3, then decrease by 1. Repeat this pattern.
Hint: Sequence, Sums, Differences.

54. **Solution: 8.** Calculating the sum of the 3 numbers in each row, from top to bottom, the rows follow the sequence of 11, 13, 15 , 17 , 19.
Hint: Sequence, Sums.

55. **Solution: 10.** In each triangle, add together the lower two digits and subtract 2 and put that number at the top.
Hint: Sums, Sequence, Sums and Differences.

56. **Solution: 31**. In each circle, starting at the left circles top left segment, numbers increase, as you move clockwise, by 2 for the left circle, 3 for the next circle, 4 for the next circle and 5 for the last circle. The last circle is 6 , 6 + 5 = 11 , 11 + 5 = 16 , 16 + 5 = 21 , 21 + 5 = 26, 26 + 5 = 3
Hint: Sequence, Sums.