TABE Math-E

PAXEN

Unit-3 Multiply and Divide Whole Numbers

Lesson 23
Number Patterns

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Some graphics may not have copied well during the scan process.

Math-E - Lesson 23 – Number Patterns

Lesson 23 Number Patterns

3.OA.9 – Low

Number patterns increase or decrease from one number to the next in the same way. You can use addition, subtraction, multiplication, or division facts to help you determine number patterns.

Example **4, 6, 8, 10, _____, _____, _____. What are the next three numbers in the pattern?**

1) Find the relationship between the first two numbers. $4 + 2 = 6$. The relationship could be +2.

2) Check to make sure that the same relationship exists between the second and third numbers. $6 + 2 = 8$. This relationship is also +2. The pattern is adding 2 to the previous number.

3) Continue the number pattern. $10 + 2 = 12$, $12 + 2 = 14$, and $14 + 2 = 16$.

So, the next three numbers in the pattern are 12, 14, and 16.

Adding 2 to an even number gives you the next even number. Because the first number, 4, is even, the next number in the pattern is always the next even number. If the first number were odd, then the next number in the +2 pattern would always be odd.

You can use an input-output table to show a number pattern. The table shows how a value (the input) is changed according to a rule. The result of the change is the output.

The rule for the table below is "multiply by 2."

Input	2	3	4	5	6
Output	4	6	8	10	12

Example **What pattern is shown in the table?**

Input	30	40	50	60	70
Output	3	4	5	6	7

1) Find the relationship between the first input and output. $30 \div 10 = 3$.

2) Check to make sure the same relationship exists with the second and third input and output. $40 \div 10 = 4$. $50 \div 10 = 5$. The relationship is $\div 10$. The pattern is dividing the input number by 10.

Test Example

1. What is the next number in this number pattern?
   2, 4, 8, 16, 32

   A. 34 B. 36
   C. 40 D. 64

1. **D** Each number is 2 times the previous number.

Strategy

Notice that all the numbers in this number pattern are even. Remember that any number multiplied by two is even.

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Practice

Read each question. Select the correct answer.

1 What pattern is shown in the table?

Input	2	3	4	5	6
Output	6	9	12	15	18

A. Add 4 to the input.
B. Add 6 to the input.
C. Multiply the input by 2.
D. Multiply the input by 3.

2 What is the next number in the pattern?

21, 28, 35, 42, _____

A. 14
B. 24
C. 49
D. 63

3 Which sum is even?

A. 3 + 3
B. 3 + 4
C. 5 + 6
D. 8 + 3

4 What does the letter *Y* stand for?

36, 32, 28, 24, *X*, *Y*, *Z*

A. 20
B. 16
C. 18
D. 48

5 Which rule could be used to complete the table?

Input	3	4	5	6	7	8
Output	24	32	40			

A. Add 12 to the input.
B. Add 24 to the input.
C. Multiply the input by 4.
D. Multiply the input by 8.

6 Which product is odd?

A. odd × odd
B. even × even
C. odd × even
D. even × odd

7 What is the next number in the pattern?

15, 20, 25, 30, _____

A. 40
B. 35
C. 25
D. 20

8 The diagram shows part of a multiplication table. What is the missing number?

X	8	9
3	24	27
4	32	

A. 31
B. 35
C. 36
D. 40

9 Which best describes the pattern?

30, 27, 24, 21, 18, 15

A. Divide by 3.
B. Multiply by 3.
C. Subtract 3.
D. Add 3.

10 What does the letter *Z* stand for?

24, 30, 36, 42, *X*, *Y*, *Z*

A. 10
B. 49
C. 54
D. 60

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(3.OA.9)

1. D. Since each set of numbers is increasing but not at a constant amount, the pattern involves multiplication. To find the multiplier, divide the second number by the first number; $6 \div 2 = 3$, so the pattern is multiply by 3; $2 \times 3 = 6$.
2. C. The pattern is +7; $42 + 7 = 49$.
3. A. An even number is one that can be divided equally by 2; $3 + 3 = 6$; $6 \div 2 = 3$.
4. B. The pattern is −4; $24 - 4 = 20$, $20 - 4 = 16$.
5. D. Since each set of numbers is increasing but not at a constant amount, the pattern involves multiplication. To find the multiplier, divide the second number by the first number; $24 \div 3 = 8$, so the pattern is multiply by 8.
6. A. A product is the result of multiplication. Substitute a number into each equation; $3 \times 3 = 9$, an odd number.
7. B. The pattern is +5; $30 + 5 = 35$.
8. C. On this cross section of the multiplication table, the top row shows the 3 times table; $3 \times 8 = 24$, $3 \times 9 = 27$. The next row, therefore, is the 4 times table; $4 \times 8 = 32$, $4 \times 9 = 36$.
9. C. The pattern is −3; $15 - 3 = 12$.
10. D. The pattern is +6; $42 + 6 = 48$, $48 + 6 = 54$, $54 + 6 = 60$.

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Practice 23 Number Patterns

3.OA.9 – Low

1 What is the next number in the pattern?

50, 42, 34, 26, ____

A. 14 B. 16

C. 18 D. 20

2 Christiano reads four pages every minute. He starts reading on page 23. What page is Christiano on after reading for four minutes?

A. page 39 B. page 37

C. page 35 D. page 33

3 What pattern is shown in the table?

Input	4	5	6	7	8	9
Output	20	25	30	35	40	45

A. Multiply the input by 6.

B. Multiply the input by 5.

C. Add 16 to the input.

D. Add 20 to the input.

4 The number pattern shown represents the number of cups of dog food remaining in a bin after each feeding. How many cups of dog food are used for each feeding?

85, 81, 77, 73, 69, 65

A. 3 cups B. 4 cups

C. 5 cups D. 6 cups

5 What does the letter *B* stand for in the pattern?

13, 19, 25, 31, *A*, *B*, *C*

A. 37 B. 39

C. 41 D. 43

6 What does the letter *V* stand for in the pattern?

128, 64, 32, *T*, *U*, *V*

A. 16 B. 8

C. 6 D. 4

7 Which rule could be used to complete the table?

Input	2	4	6	8	10	12
Output	22	24	26	28	30	

A. Multiply the input by 6.

B. Multiply the input by 11.

C. Add 20 to the input.

D. Add 30 to the input.

8 What are the next two numbers in the pattern?

52, 45, 38, 31, ____, ____

A. 26, 21

B. 25, 19

C. 24, 17

D. 23, 15

9 Esmeralda fills a pool and records the number of gallons of water in the pool each minute in the table shown. What is the missing number in the table?

Minutes	1	2	3	4	5	6
Gallons of Water	6	12		24	30	36

A. 20

B. 18

C. 16

D. 14

10 Vienna conducts experiments in a laboratory. She records the number of fruit flies in a large container for four days. Based on the pattern, which rule could be used to find the number of fruit flies on day 5?

3, 9, 27, 81

A. Multiply by 3.

B. Multiply by 4.

C. Add 6.

D. Add 18.

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11 What pattern is shown in the table?

Input	21	28	35	42	49
Output	3	4	5	6	7

A. Divide the input by 6.
B. Divide the input by 7.
C. Subtract 18 from the input.
D. Subtract 24 from the input.

12 What are the next two numbers in the pattern?

Input	2	3	4	5	6	7
Output	18	27	36	45		

A. 51, 57
B. 54, 63
C. 57, 69
D. 60, 75

13 Which <u>best</u> describes the pattern?

120, 100, 80, 60, 40, 20

A. Multiply by 20.
B. Divide by 20.
C. Subtract 20.
D. Add 20.

14 Beginning on June 1st, Sabrina decides to run twice as many laps around a track as the day of the month. How many laps does Sabrina run on June 10th?

A. 14 laps
B. 16 laps
C. 18 laps
D. 20 laps

15 Which rule could be used to complete the table?

Input	24	28	32	36	40	44
Output	10	14	18	22		

A. Subtract 18 from the input.
B. Subtract 16 from the input.
C. Subtract 14 from the input.
D. Subtract 12 from the input.

16 The table shows Onish's distance from home, in miles, after each hour of biking. Which rule describes the pattern?

Hour	3	4	5	6
Miles from Home	45	60	75	90

A. Multiply the hour by 15.
B. Multiply the hour by 12.
C. Add 40 to the hour.
D. Add 45 to the hour.

17 The number pattern shown represents the number of comments on Neil's blog at the end of each week. What is the next number in the pattern?

12, 24, 36, 48, 60, 72, ___

A. 78 B. 80
C. 82 D. 84

18 What is the next number in the pattern?

25, 38, 51, 64, ____

A. 75
B. 76
C. 77
D. 78

19 The table shows the number of pretzels Shondra has after baking batches of pretzels. What could be a rule for the pattern?

Number of Batches	3	4	5	6	7
Number of Pretzels	54	72	90	108	126

A. Add 16 to the number of batches.
B. Add 18 to the number of batches.
C. Multiply the number of batches by 16.
D. Multiply the number of batches by 18.

20 Which <u>best</u> describes the pattern?

2, 8, 32, 128

A. Multiply by 4.
B. Multiply by 6.
C. Add 6.
D. Add 24.

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Practice 23 Number Patterns

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1. C. The pattern is − 8: 26 − 8 = 18.
2. A. The pattern is + 4: 23 + 4 = 27 at 1 minute, 27 + 4 = 31 at 2 minutes, 31 + 4 = 35 at 3 minutes, 35 + 4 = 39 at 4 minutes. Christiano is on page 39 after four minutes.
3. B. Each set of numbers is increasing. The pattern involves multiplication. To find the relationship, divide the first output by the first input number: 20 ÷ 4 = 5, so 4 × 5 = 20. Check that the other inputs and outputs have the same relationship: 5 × 5 = 25. . . 9 × 5 = 45. The pattern is multiply the input by 5.
4. B. The numbers are decreasing. The pattern involves subtraction. To find the relationship, subtract the second number from the first number: 85 − 81 = 4. Check that the other numbers have the same relationship: 81 − 4 = 77. . . 69 − 4 = 65. The pattern is subtract 4. Four cups of dog food are used for each feeding.
5. D. The pattern is + 6: 31 + 6 = 37; 37 + 6 = 43. The letter *B* stands for 43.
6. D. The pattern is ÷ 2: 32 ÷ 2 = 16; 16 ÷ 2 = 8; 8 ÷ 2 = 4. The letter *V* stands for 4.
7. C. Each set of numbers is increasing. The pattern involves addition. To find the relationship, subtract the first input from the first output: 22 − 2 = 20, so 2 + 20 = 22. Check that the other inputs and outputs have the same relationship: 4 + 20 = 24 . . . 10 + 20 = 30. The rule is add 20 to the input.
8. C. The pattern is − 7: 31 − 7 = 24; 24 − 7 = 17.
9. B. The pattern is × 6. The missing number is 3 × 6 = 18.
10. A. The numbers are increasing. The pattern involves multiplication. To find the relationship, divide the second number by the first number: 9 ÷ 3 = 3, so 3 × 3 = 9. Check that other numbers have the same relationship: 9 × 3 = 27. . . 27 × 3 = 81. The rule is multiply by 3. To find the number of fruit flies on day 5, Vienna would multiply 81 by 3.
11. B. Each set of numbers is decreasing. The pattern involves division. To find the relationship, divide the first input by the first output: 21 ÷ 3 = 7. Check that the other inputs and outputs have the same relationship: 28 ÷ 4 = 7. . . 49 ÷ 7 = 7. The pattern is divide the input by 7.
12. B. The pattern is × 9: 6 × 9 = 54; 7 × 9 = 63.
13. C. The numbers are decreasing. The pattern involves subtraction. To find the relationship, subtract the second number from the first number: 120 − 100 = 20. Check that the other numbers have the same relationship: 100 − 80 = 20. . . 40 − 20 = 20. The pattern is subtract 20.
14. D. The pattern is multiply the number day of the month by 2: 10 × 2 = 20. Sabrina runs 20 laps on June 10th.
15. C. Each set of numbers is decreasing. The pattern involves subtraction. To find the relationship, subtract the first output from the first input: 24 − 10 = 14. Check that the other inputs and outputs have the same relationship: 28 − 14 = 14. . . 36 − 14 = 22. The rule is subtract 14 from each input.
16. A. Each set of numbers is increasing. The pattern involves multiplication. To find the relationship, divide the first output by the first input; 45 ÷ 3 = 15, so 3 × 15 = 45. Check that the other inputs and outputs have the same relationship: 4 × 15 = 60. . . 6 × 15 = 90. The pattern is multiply the hour by 15.
17. D. The pattern is + 12: 72 + 12 = 84.
18. C. The pattern is + 13: 64 + 13 = 77.
19. D. Each set of numbers is increasing. The pattern involves multiplication. To find the relationship, divide the first output by the first input; 54 ÷ 3 = 18, so 3 × 18 = 54. Check that the other inputs and outputs have the same relationship: 4 × 18 = 72. . . 7 × 18 = 126. The rule is multiply the number of batches by 18.
20. A. The numbers are increasing. The pattern involves multiplication. To find the relationship, divide the second number by the first number: 8 ÷ 2 = 4, so 2 × 4 = 8. Check that other numbers have the same relationship: 8 × 4 = 32. . . 32 × 4 = 128. The rule is multiply by 4.