Coaching Tips: 4th - Number Patterns

This kind of table is often used to show the relationship between the position of a number in a pattern and its value.

Position	Expression	Value
1	1 X 2	2
2	2 X 2	4
3	3 X 2	6
4	4 X 2	8

Position = Position in the pattern. These will be numbers in sequence – most likely 1,2,3,4 for these questions.

Expression = the mathematical process you are going to apply to the number of the position to get the value. The expression is sometimes called the "rule." In this example, the rule is to multiply the position X 2. To make a pattern, you apply the same rule to each position to get the value of the number in the pattern.

Value = The value is the result of applying the mathematical process (the rule) to the position. The value will always be the "answer" to the expression.

These are often called **input-output tables**, you apply the same rule (mathematical process) to all the inputs to get the output. The table doesn't have to have the "expression" column in the middle.

For example, using the same example as above, here is an Input-Output table that uses the rule "X2":

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1	2
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4	8

Tips for identifying wrong answers:

If the question says, "A pattern **BEGINS** with these **VALUES**…" the numbers in the Position list are going to be 1,2,3,4 – if they are not, the choice is probably wrong. Also be sure the values listed are in the "Values" column.

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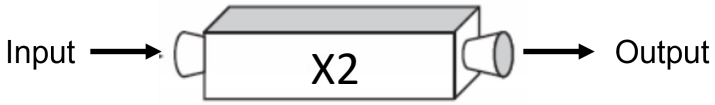


Input	Output
1	2
2	4
3	6
4	8

How to figure out the rule…

Figuring out the rule for creating a number pattern is basically a matter of systematically using trial and error. For example – consider the question below.

The table shows the relationship between the position of a number in a pattern and its value.

Position	Value
1	10
2	11
3	12
4	13

Which rule shows how to find the value when given the position?

A. - 9
B. X 10
C. X 4
D. + 9

First try the rule with the 1st position…

- "A" will not work because 1 - 9 ≠ 10
- "B" might work because 1 X10 = 10
- "C" will not work because 1 X4 ≠ 10
- "D" might work because 1 + 9 ≠ 10

So, after trying the 1st position "B" or "D" might work.

Now go on to the 2nd position with the remaining possibilities…

- "B" will not work because 2 X 10 ≠ 11
- "D" might work because 2 + 9 = 11.

So, "D" must be the right answer.

Unit: 4th - Number Patterns & Data Analysis
Lesson: 4.5.B – Number Patterns
Problem Set 1

1

C

2

D

3

D

4

A

5

+16

6

Input	Output
1	113
2	114
3	115
4	116

7

A

8

D

9

B

10

B

11

X 6

12

Input	Output
1	0
2	0
3	0
4	0

13

C

14

B

15

D

16

B

17

- 1

18

Input	Output
1	15
2	30
3	45
4	60

19

D

20

D

21

A

22

C

23

X 22

24

Input	Output
1	33
2	34
3	35
4	36

25

B

26

A

27

A

28

A

29

+87

30

Input	Output
1	11
2	22
3	33
4	44

1. The table shows a relationship between the position of a number in a pattern and its value.

Position	Expression	Value
1		21
2		42
3		63
4		84

Which set of expressions shows how to find the value when given the position?

A.

Expression
21 – 20
42 – 20
63 – 20
84 – 20

B.

Expression
1 + 20
2 + 20
3 + 20
4 + 20

C.

Expression
1 X 21
2 X 21
3 X 21
4 X 21

D.

Expression
1 X 2
2 X 2
3 X 2
4 X 2

2. The table shows a relationship between input numbers and output numbers.

Number Machine

Input	Output
1	10
2	11
3	12
4	13

Which rule can be used to find the output number when the input number is given?

A. - 9

B. X 10

C. X4

D. +9

3. A number pattern begins with these values:

6,12,18,24, …

Which table correctly represents the relationship between the position of a number in the pattern and the value of that number?

A.

Position	Numerical Expression	Value
6	6 X 1	6
12	12 X 1	12
18	18 X 1	18
24	24 X 1	24

B.

Position	Numerical Expression	Value
6	6 ÷ 6	1
12	12 ÷ 6	2
18	18 ÷ 6	3
24	24 ÷ 6	4

C.

Position	Numerical Expression	Value
1	1 + 6	7
2	2 + 6	8
3	3 + 6	9
4	4 + 6	10

D.

Position	Numerical Expression	Value
1	1 X 6	6
2	2 X 6	12
3	3 X 6	18
4	4 X 6	24

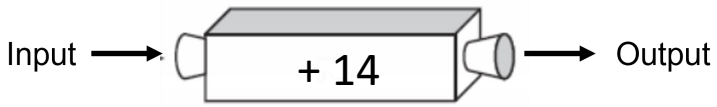
4. The table shows a relationship between input numbers and output numbers.

Number Machine

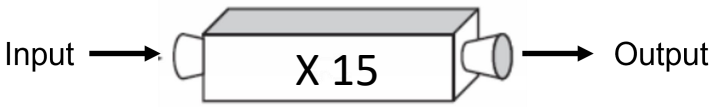
Input	Output
1	15
2	16
3	17
4	18

Which number machine shows the same relationship as the one shown in the table?

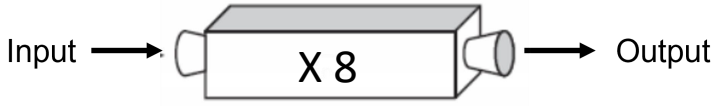
A.



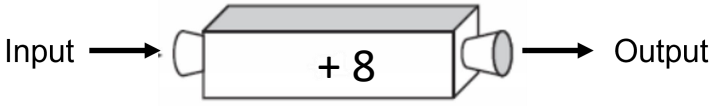
B.



C.



D.

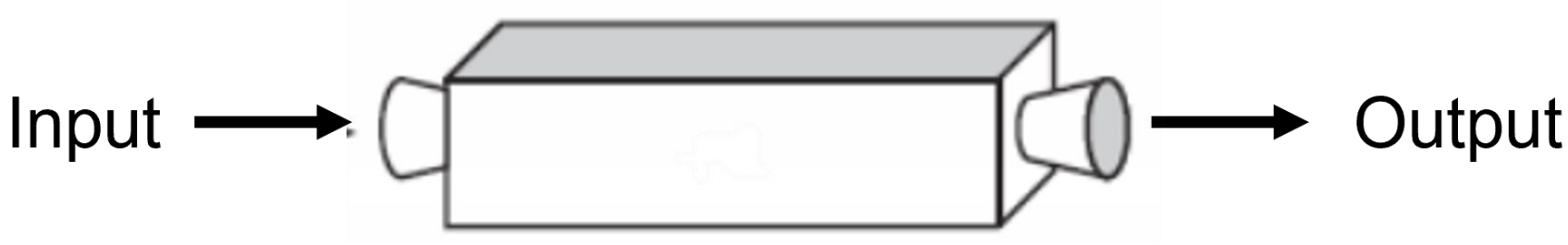


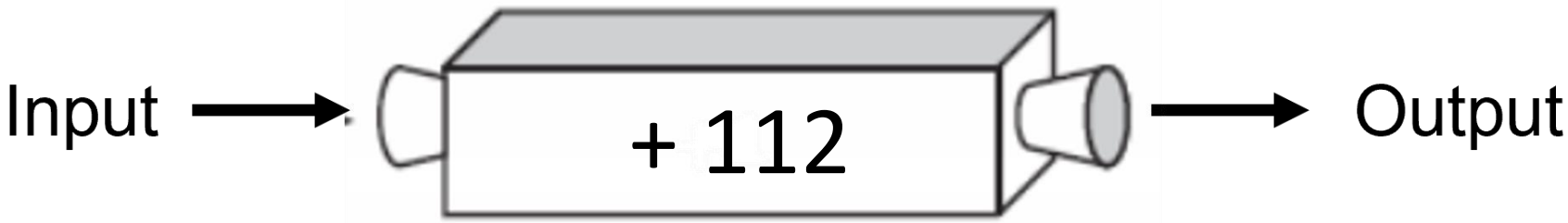
5. The table shows a relationship between input numbers and output numbers generated by a number Machine.

Number Machine

Input	Output
1	17
2	18
3	19
4	20

What rule belongs in the number machine to create the table above?





6. Given the number machine above, what numbers belong in the output column of the table below?

Number Machine

Input	Output
1	
2	
3	
4	

Coaching Tips: 4th - Number Patterns

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2	2 X 2	4
3	3 X 2	6
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For example, using the same example as above, here is an Input-Output table that uses the rule "X2":

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4	8

Tips for identifying wrong answers:

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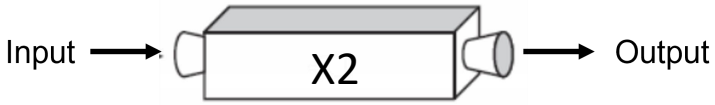

Input	Output
1	2
2	4
3	6
4	8

How to figure out the rule…

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Position	Value
1	10
2	11
3	12
4	13

Which rule shows how to find the value when given the position?

A. - 9
B. X 10
C. X 4
D. + 9

First try the rule with the 1st position…

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So, after trying the 1st position "B" or "D" might work.

Now go on to the 2nd position with the remaining possibilities…

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So, "D" must be the right answer.

Unit: 4th - Number Patterns & Data Analysis
Lesson: 4.5.B – Number Patterns
Problem Set 2

1

C

2

D

3

D

4

A

5

+16

6

Input	Output
1	113
2	114
3	115
4	116

7

A

8

D

9

B

10

B

11

X 6

12

Input	Output
1	0
2	0
3	0
4	0

13

C

14

B

15

D

16

B

17

- 1

18

Input	Output
1	15
2	30
3	45
4	60

19

D

20

D

21

A

22

C

23

X 22

24

Input	Output
1	33
2	34
3	35
4	36

25

B

26

A

27

A

28

A

29

+87

30

Input	Output
1	11
2	22
3	33
4	44

7. The table shows a relationship between the position of a number in a pattern and its value.

Position	Expression	Value
1		6
2		12
3		18
4		24

Which set of expressions shows how to find the value when given the position?

A.

Expression
1 X 6
2 X 6
3 X 6
4 X 6

B.

Expression
1 + 5
7 + 5
13 + 5
19 + 5

C.

Expression
7 – 1
14 – 2
21 – 3
28 – 4

D.

Expression
1 + 6
2 + 6
3 + 6
4 + 6

8. The table shows a relationship between the position of a number in a pattern and its value.

Position	Value
1	33
2	34
3	35
4	36

Which rule shows how to find the value when given the position?

A. X 33

B. -32

C. ÷ 33

D. + 32

9. A number pattern begins with these values:

8,16,24,32…

Which table correctly represents the relationship between the position of a number in the pattern and the value of that number

A.

Position	Numerical Expression	Value
1	1 + 8	9
2	2 + 8	10
3	3 + 8	11
4	4 + 8	12

B.

Position	Numerical Expression	Value
1	1 X 8	8
2	2 X 8	16
3	3 X 8	24
4	4 X 8	32

C.

Position	Numerical Expression	Value
8	8 + 0	8
16	16 + 0	16
24	24 + 0	24
32	32 + 0	32

D.

Position	Numerical Expression	Value
8	8 X 1	8
16	16 X 1	16
24	24 X 1	24
32	32 X 1	32

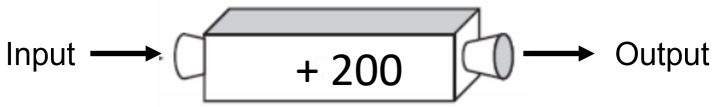
10. The table shows a relationship between input numbers and output numbers generated by a number Machine.

Number Machine

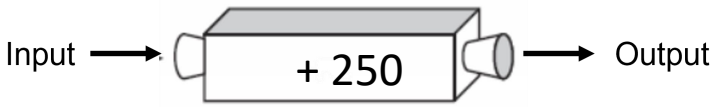
Input	Output
1	251
2	252
3	253
4	254

Which number machine shows the same relationship as the one shown in the table?

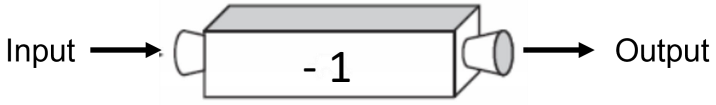
A.



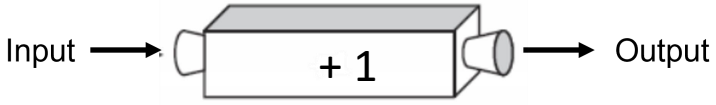
B.



C.



D.



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Number Machine

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2	12
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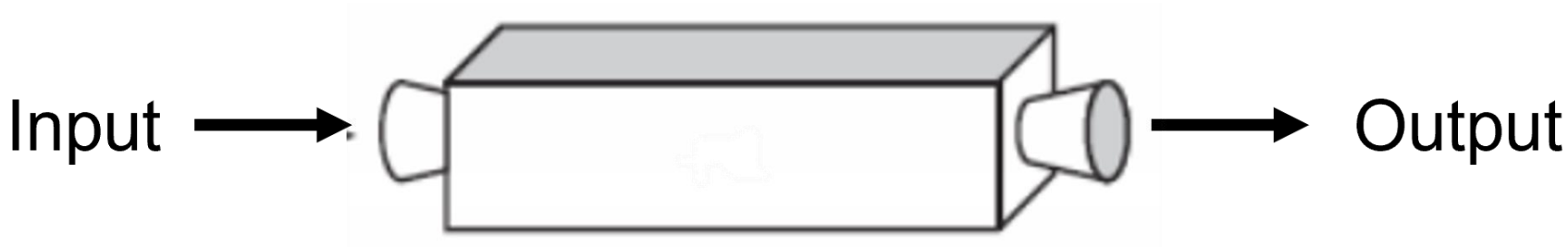
4	24

What rule belongs in the number machine to create the table above?



12. Given the number machine above, what numbers belong in the output column of the table below?

Number Machine

Input	Output
1	
2	
3	
4	

Coaching Tips: 4th - Number Patterns

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1	2
2	4
3	6
4	8

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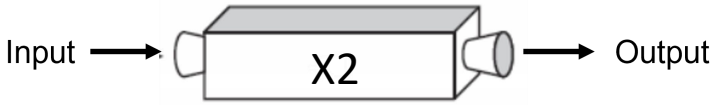

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3	6
4	8

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3	12
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C. X 4
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- "C" will not work because 1 X4 ≠ 10
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So, after trying the 1st position "B" or "D" might work.

Now go on to the 2nd position with the remaining possibilities…

- "B" will not work because 2 X 10 ≠ 11
- "D" might work because 2 + 9 = 11.

So, "D" must be the right answer.

Unit: 4th - Number Patterns & Data Analysis
Lesson: 4.5.B – Number Patterns
Problem Set 3

1

C

2

D

3

D

4

A

5

+16

6

Input	Output
1	113
2	114
3	115
4	116

7

A

8

D

9

B

10

B

11

X 6

12

Input	Output
1	0
2	0
3	0
4	0

13

C

14

B

15

D

16

B

17

- 1

18

Input	Output
1	15
2	30
3	45
4	60

19

D

20

D

21

A

22

C

23

X 22

24

Input	Output
1	33
2	34
3	35
4	36

25

B

26

A

27

A

28

A

29

+87

30

Input	Output
1	11
2	22
3	33
4	44

13. The table shows a relationship between the position of a number in a pattern and its value.

Position	Expression	Value
1		58
2		59
3		60
4		61

Which set of expressions shows how to find the value when given the position?

A.

Expression
59 – 1
59 – 2
59 – 3
59 – 4

B.

Expression
1 + 57
2 + 58
3 + 59
4 + 60

C.

Expression
1 + 57
2 + 57
3 + 57
4 + 57

D.

Expression
1 + 57
1 + 58
1 + 59
1 + 60

14. The table shows a relationship between the position of a number in a pattern and its value.

Position	Value
1	12
2	24
3	36
4	48

Which rule shows how to find the value when given the position?

A. + 12

B. X 12

C. ÷ 12

D. X 4

15. The rule +38 is used to show the relationship between the position of a number in a pattern and the value f that number. Which table shows this relationship?

A.

Position	Numerical Expression	Value
38	38 + 1	39
38	38 + 2	40
38	38 + 3	41
38	38 + 4	42

B.

Position	Numerical Expression	Value
38	38 X 1	38
38	38 + 0	38
38	38 ÷ 1	38
38	38 – 0	38

C.

Position	Numerical Expression	Value
1	1 + 37	38
2	2 + 36	38
3	3 + 35	38
4	4 + 34	38

D.

Position	Numerical Expression	Value
1	1 + 38	39
2	2 + 38	40
3	3 + 38	41
4	4 + 38	42

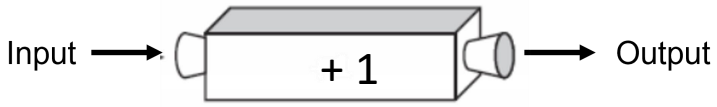
16. The table shows a relationship between input numbers and output numbers generated by a number Machine.

Number Machine

Input	Output
1	79
2	80
3	81
4	82

Which number machine shows the same relationship as the one shown in the table?

A.



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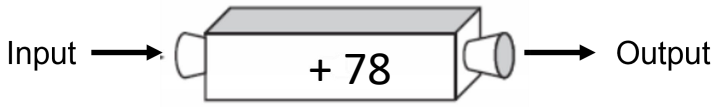

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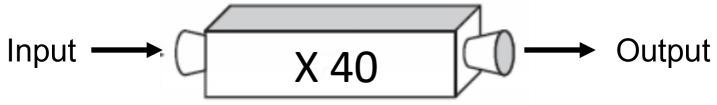
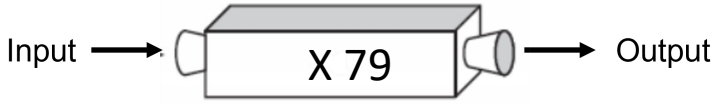


D.

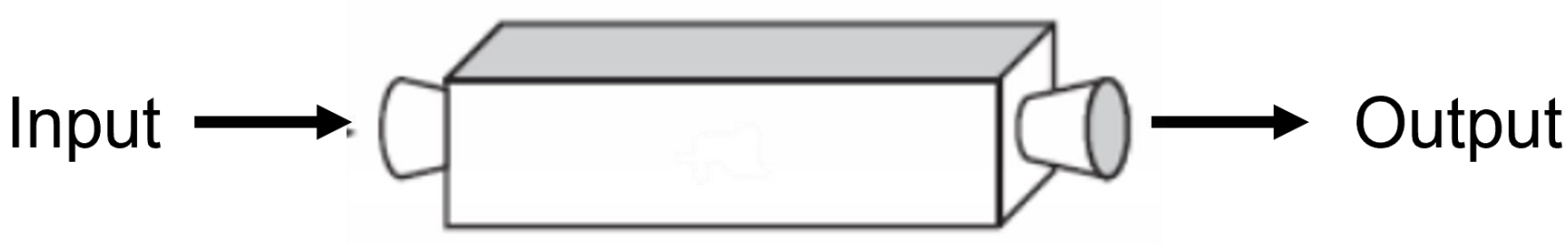


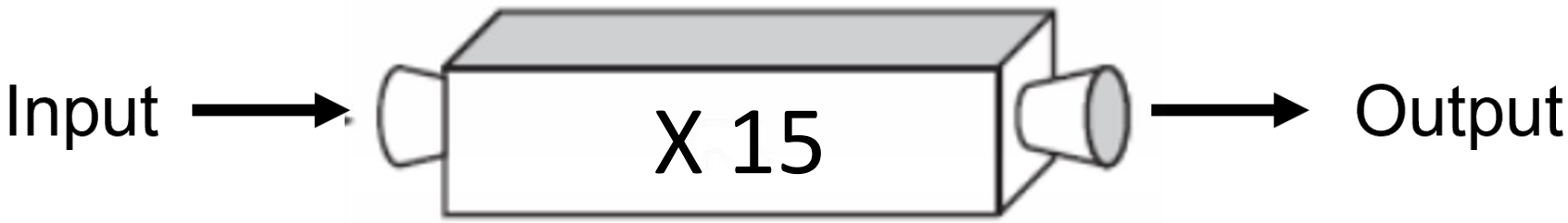
17. The table shows a relationship between input numbers and output numbers generated by a number Machine.

Number Machine

Input	Output
1	0
2	1
3	2
4	3

What rule belongs in the number machine to create the table above?





18. Given the number machine above, what numbers belong in the output column of the table below?

Number Machine

Input	Output
1	
2	
3	
4	

Coaching Tips: 4th - Number Patterns

This kind of table is often used to show the relationship between the position of a number in a pattern and its value.

Position	Expression	Value
1	1 X 2	2
2	2 X 2	4
3	3 X 2	6
4	4 X 2	8

Position = Position in the pattern. These will be numbers in sequence – most likely 1,2,3,4 for these questions.

Expression = the mathematical process you are going to apply to the number of the position to get the value. The expression is sometimes called the "rule." In this example, the rule is to multiply the position X 2. To make a pattern, you apply the same rule to each position to get the value of the number in the pattern.

Value = The value is the result of applying the mathematical process (the rule) to the position. The value will always be the "answer" to the expression.

These are often called **input-output tables**, you apply the same rule (mathematical process) to all the inputs to get the output. The table doesn't have to have the "expression" column in the middle.

For example, using the same example as above, here is an Input-Output table that uses the rule "X2":

Input	Output
1	2
2	4
3	6
4	8

Tips for identifying wrong answers:

If the question says, "A pattern **BEGINS** with these **VALUES**…" the numbers in the Position list are going to be 1,2,3,4 – if they are not, the choice is probably wrong. Also be sure the values listed are in the "Values" column.

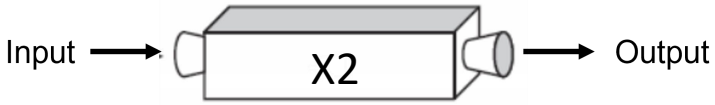
The first number in the "expression" is always going to be the position number (most likely 1,2,3,4). If the first number in the expression is something other than the position number – then it is most likely a wrong answer.

The "Rule" in a number pattern, for example, X 2, is always going to be the same. If the rules are different, for example - X2, X3, X 4 – then the choice is probably wrong.

The number in the Value column is always going to be the result of the expression applied to the position number. Sometimes the test makers will try to trick you by putting the position numbers in the Value column and vice versa so watch out for that.

What are "Number Machines?"

Sometimes the questions will talk about a number machine. This is just another way of asking about the rule that you are going to apply to make the number pattern. To continue with the example we have been using, the "number machine" for this input – output table would be "X2.



Input	Output
1	2
2	4
3	6
4	8

How to figure out the rule…

Figuring out the rule for creating a number pattern is basically a matter of systematically using trial and error. For example – consider the question below.

The table shows the relationship between the position of a number in a pattern and its value.

Position	Value
1	10
2	11
3	12
4	13

Which rule shows how to find the value when given the position?

A. - 9
B. X 10
C. X 4
D. + 9

First try the rule with the 1st position…

- "A" will not work because 1 - 9 ≠ 10
- "B" might work because 1 X10 = 10
- "C" will not work because 1 X4 ≠ 10
- "D" might work because 1 + 9 ≠ 10

So, after trying the 1st position "B" or "D" might work.

Now go on to the 2nd position with the remaining possibilities…

- "B" will not work because 2 X 10 ≠ 11
- "D" might work because 2 + 9 = 11.

So, "D" must be the right answer.

Unit: 4th - Number Patterns & Data Analysis
Lesson: 4.5.B – Number Patterns
Problem Set 4

1

C

2

D

3

D

4

A

5

+16

6

Input	Output
1	113
2	114
3	115
4	116

7

A

8

D

9

B

10

B

11

X 6

12

Input	Output
1	0
2	0
3	0
4	0

13

C

14

B

15

D

16

B

17

- 1

18

Input	Output
1	15
2	30
3	45
4	60

19

D

20

D

21

A

22

C

23

X 22

24

Input	Output
1	33
2	34
3	35
4	36

25

B

26

A

27

A

28

A

29

+87

30

Input	Output
1	11
2	22
3	33
4	44

19. The table shows a relationship between the position of a number in a pattern and its value.

Position	Expression	Value
1		18
2		36
3		54
4		72

Which set of expressions shows how to find the value when given the position?

A.

Expression
2 X 9
4 X 9
6 X 9
8 X 9

B.

Expression
1 + 17
2 + 34
3 + 51
4 + 68

C.

Expression
3 X 6
6 X 6
9 X 6
12 X 6

D.

Expression
1 X 18
2 X 18
3 X 18
4 X 18

20. The table shows a relationship between the position of a number in a pattern and its value.

Position	Value
1	28
2	29
3	30
4	31

Which rule shows how to find the value when given the position?

A. X 28

B. X 7

C. - 27

D. + 27

21. The rule X 11 is used to show the relationship between the position of a number in a pattern and the value of that number. Which table shows this relationship?

A.

Position	Numerical Expression	Value
1	1 X 11	11
2	2 X 11	22
3	3 X 11	33
4	4 X 11	44

B.

Position	Numerical Expression	Value
38	38 X 1	38
38	38 + 0	38
38	38 ÷ 1	38
38	38 – 0	38

C.

Position	Numerical Expression	Value
1	1 + 37	38
2	2 + 36	38
3	3 + 35	38
4	4 + 34	38

D.

Position	Numerical Expression	Value
1	1 + 38	39
2	2 + 38	40
3	3 + 38	41
4	4 + 38	42

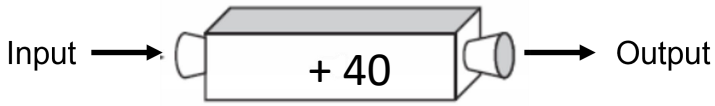
22. The table shows a relationship between input numbers and output numbers generated by a number Machine.

Number Machine

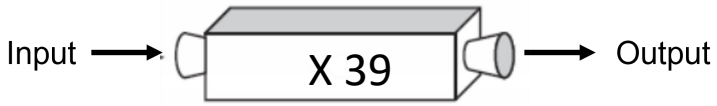
Input	Output
1	41
2	82
3	123
4	164

Which number machine shows the same relationship as the one shown in the table?

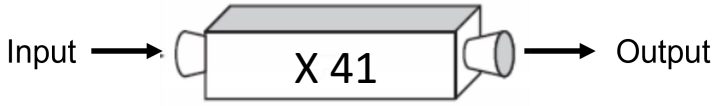
A.



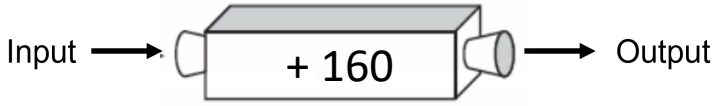
B.



C.



D.

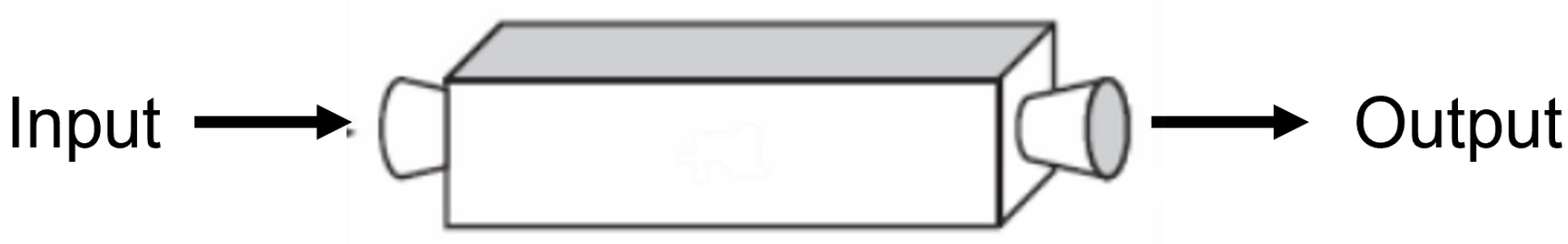


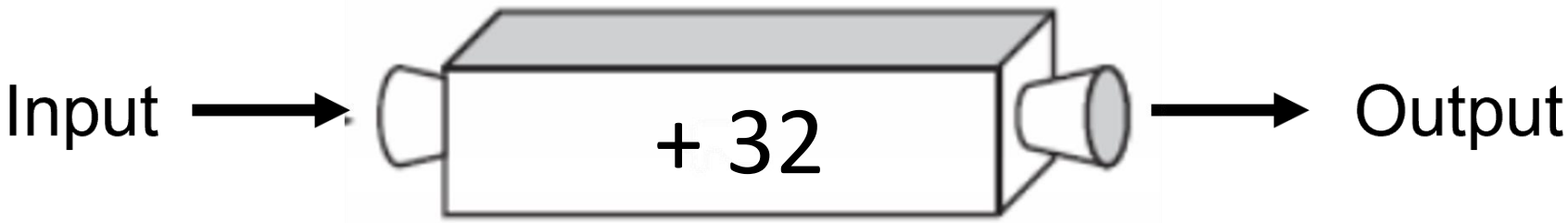
23. The table shows a relationship between input numbers and output numbers generated by a number Machine.

Number Machine

Input	Output
1	22
2	44
3	66
4	88

What rule belongs in the number machine to create the table above?





24. Given the number machine above, what numbers belong in the output column of the table below?

Number Machine

Input	Output
1	
2	
3	
4	

Coaching Tips: 4th - Number Patterns

This kind of table is often used to show the relationship between the position of a number in a pattern and its value.

Position	Expression	Value
1	1 X 2	2
2	2 X 2	4
3	3 X 2	6
4	4 X 2	8

Position = Position in the pattern. These will be numbers in sequence – most likely 1,2,3,4 for these questions.

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Value = The value is the result of applying the mathematical process (the rule) to the position. The value will always be the "answer" to the expression.

These are often called **input-output tables**, you apply the same rule (mathematical process) to all the inputs to get the output. The table doesn't have to have the "expression" column in the middle.

For example, using the same example as above, here is an Input-Output table that uses the rule "X2":

Input	Output
1	2
2	4
3	6
4	8

Tips for identifying wrong answers:

If the question says, "A pattern **BEGINS** with these **VALUES**…" the numbers in the Position list are going to be 1,2,3,4 – if they are not, the choice is probably wrong. Also be sure the values listed are in the "Values" column.

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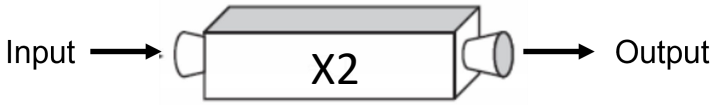


Input	Output
1	2
2	4
3	6
4	8

How to figure out the rule…

Figuring out the rule for creating a number pattern is basically a matter of systematically using trial and error. For example – consider the question below.

The table shows the relationship between the position of a number in a pattern and its value.

Position	Value
1	10
2	11
3	12
4	13

Which rule shows how to find the value when given the position?

A. - 9
B. X 10
C. X 4
D. + 9

First try the rule with the 1st position…

- "A" will not work because 1 - 9 ≠ 10
- "B" might work because 1 X10 = 10
- "C" will not work because 1 X4 ≠ 10
- "D" might work because 1 + 9 ≠ 10

So, after trying the 1st position "B" or "D" might work.

Now go on to the 2nd position with the remaining possibilities…

- "B" will not work because 2 X 10 ≠ 11
- "D" might work because 2 + 9 = 11.

So, "D" must be the right answer.

Unit: 4th - Number Patterns & Data Analysis
Lesson: 4.5.B – Number Patterns
Problem Set 5

1

C

2

D

3

D

4

A

5

+16

6

Input	Output
1	113
2	114
3	115
4	116

7

A

8

D

9

B

10

B

11

X 6

12

Input	Output
1	0
2	0
3	0
4	0

13

C

14

B

15

D

16

B

17

- 1

18

Input	Output
1	15
2	30
3	45
4	60

19

D

20

D

21

A

22

C

23

X 22

24

Input	Output
1	33
2	34
3	35
4	36

25

B

26

A

27

A

28

A

29

+87

30

Input	Output
1	11
2	22
3	33
4	44

25. The table shows a relationship between the position of a number in a pattern and its value.

Position	Expression	Value
1		14
2		15
3		16
4		17

Which set of expressions shows how to find the value when given the position?

A.

Expression
14 – 1
15 – 2
16 – 3
17 – 4

B.

Expression
1 + 13
2 + 13
3 + 13
4 + 13

C.

Expression
2 X 7
3 X 5
4 X 4
5 X 4

D.

Expression
10 + 4
10 + 5
10 + 6
10 + 7

26. The table shows a relationship between the position of a number in a pattern and its value.

Position	Value
1	1
2	2
3	3
4	4

Which rule shows how to find the value when given the position?

A. + 0

B. X 0

C. + 1

D. - 1

27. A number pattern begins with these values:

16, 17, 18 19…

Which table correctly represents the relationship between the position of a number in the pattern and the value of that number

A.

Position	Numerical Expression	Value
1	1 + 15	16
2	2 + 15	17
3	3 + 15	18
4	4 + 15	19

B.

Position	Numerical Expression	Value
16	16 – 1	15
17	17 – 2	15
18	18 – 3	15
19	19 – 4	15

C.

Position	Numerical Expression	Value
1	17 – 1	16
2	19 – 2	17
3	21 – 3	18
4	25 – 4	19

D.

Position	Numerical Expression	Value
1	1 X 16	16
2	1 X 17	17
3	1 X 18	18
4	1 X 19	19

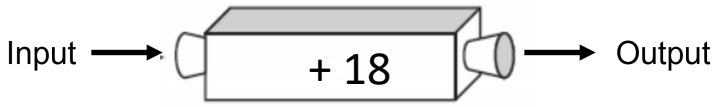
28. The table shows a relationship between input numbers and output numbers generated by a number Machine.

Number Machine

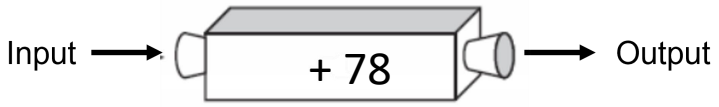
Input	Output
1	19
2	20
3	21
4	23

Which number machine shows the same relationship as the one shown in the table?

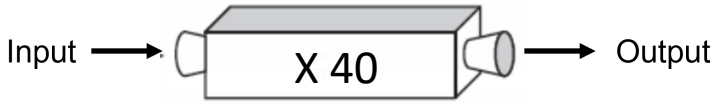
A.



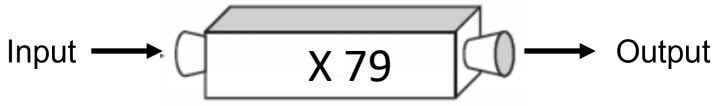
B.



C.



D.

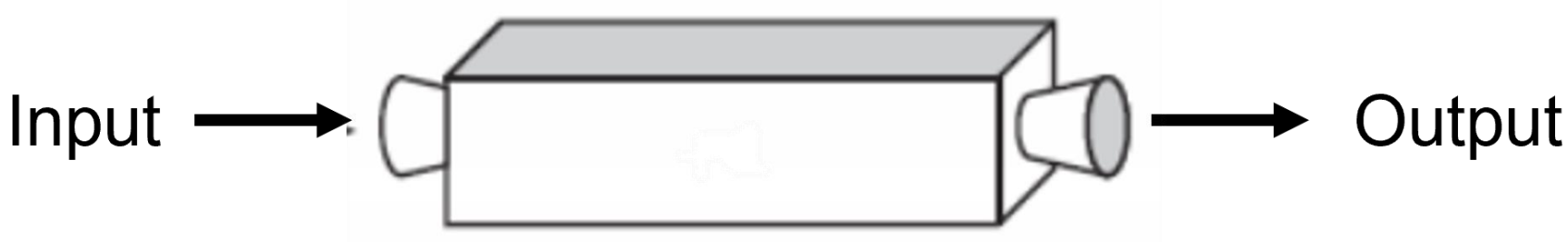


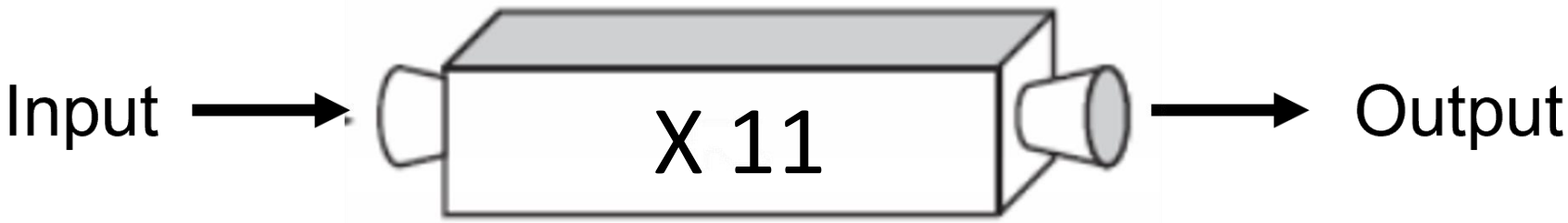
29. The table shows a relationship between input numbers and output numbers generated by a number Machine.

Number Machine

Input	Output
1	88
2	89
3	90
4	91

What rule belongs in the number machine to create the table above?





30. Given the number machine above, what numbers belong in the output column of the table below?

Number Machine

Input	Output
1	
2	
3	
4	