

PA6-1: Increasing Sequences

In an **increasing sequence**, each number is greater than the one before it.

Deborah wants to continue the number pattern:

6, 8, 10, 12, ?

She finds the **difference** between the first two numbers:



$\begin{matrix} \textcircled{2} \\ 6, 8, 10, 12, ? \end{matrix}$

She finds that the difference between the other numbers in the pattern is also 2. So the pattern was made by adding 2:

$\begin{matrix} \textcircled{2} & \textcircled{2} & \textcircled{2} \\ 6, 8, 10, 12, ? \end{matrix}$

To continue the pattern, Deborah adds 2 to the last number in the sequence.

$\begin{matrix} \textcircled{2} & \textcircled{2} & \textcircled{2} & \textcircled{2} \\ 6, 8, 10, 12, \underline{14} \end{matrix}$

The final number in the pattern is 14:

1. Extend the following patterns. Start by finding the gap between the numbers.

a) $\begin{matrix} \textcircled{} & \textcircled{} & \textcircled{} & \textcircled{} & \textcircled{} \\ 2, 5, 8, \underline{}, \underline{}, \underline{} \end{matrix}$

b) $\begin{matrix} \textcircled{} & \textcircled{} & \textcircled{} & \textcircled{} & \textcircled{} \\ 1, 7, 13, \underline{}, \underline{}, \underline{} \end{matrix}$

c) $\begin{matrix} \textcircled{} & \textcircled{} & \textcircled{} & \textcircled{} & \textcircled{} \\ 2, 7, 12, \underline{}, \underline{}, \underline{} \end{matrix}$

d) $\begin{matrix} \textcircled{} & \textcircled{} & \textcircled{} & \textcircled{} & \textcircled{} \\ 4, 8, 12, \underline{}, \underline{}, \underline{} \end{matrix}$

e) $\begin{matrix} \textcircled{} & \textcircled{} \\ 1, 6, 11, \underline{}, \underline{}, \underline{} \end{matrix}$

f) $\begin{matrix} \textcircled{} & \textcircled{} \\ 4, 10, 16, \underline{}, \underline{}, \underline{} \end{matrix}$

g) $\begin{matrix} \textcircled{} & \textcircled{} \\ 2, 12, 22, \underline{}, \underline{}, \underline{} \end{matrix}$

h) $\begin{matrix} \textcircled{} & \textcircled{} \\ 7, 15, 23, \underline{}, \underline{}, \underline{} \end{matrix}$

i) $\begin{matrix} \textcircled{} & \textcircled{} \\ 31, 34, 37, \underline{}, \underline{}, \underline{} \end{matrix}$

j) $\begin{matrix} \textcircled{} & \textcircled{} \\ 92, 98, 104, \underline{}, \underline{}, \underline{} \end{matrix}$

k) $\begin{matrix} \textcircled{} & \textcircled{} \\ 12, 23, 34, \underline{}, \underline{}, \underline{} \end{matrix}$

l) $\begin{matrix} \textcircled{} & \textcircled{} \\ 0, 8, 16, \underline{}, \underline{}, \underline{} \end{matrix}$

2. A plant that is 17 cm high grows 2 cm each day.

a) How high will the plant be after three days? _____

b) In how many days will the plant be 27 cm high? _____



Sample pages were taken from a different edition of JUMP!

PA6-2: Decreasing Sequences

In a **decreasing sequence**, each number is less than the one before it.

Inder wants to continue the number pattern:

25, 23, 21, ?

She finds the **difference** between the first two numbers:



25



24



23

25, 23, 21, ?

25, 23, 21, ?

She finds that the difference between the other numbers in the pattern is also 2. So the pattern was made by subtracting 2.

25, 23, 21, 19

The final number in the pattern is 19:

1. Extend the following patterns:

a) 18, 15, 12, , ,

b) 32, 26, 20, , ,

c) 52, 47, 42, , ,

d) 34, 30, 26, , ,

e) 51, 46, 41, , ,

f) 84, 80, 76, , ,

g) 62, 51, 40, , ,

h) 97, 89, 81, , ,

i) 71, 64, 57, , ,

j) 62, 58, 54, , ,

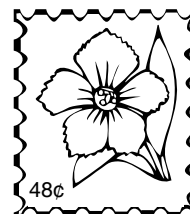
k) 82, 73, 64, , ,

l) 84, 72, 60, , ,

Use decreasing sequences to solve these problems:

2. Judi has saved \$49. She spends \$8 each day. How much money does she have left after 5 days?

3. Yen has a roll of 74 stamps. She uses 7 each day for 4 days. How many are left?



PA6-4: Identifying Pattern Rules

1. What number was added to make the sequence?

- a) 12, 17, 22, 27 add ____ b) 32, 35, 38, 41 add ____
- c) 28, 34, 40, 46 add ____ d) 50, 57, 64, 71 add ____
- e) 101, 106, 111, 116 add ____ f) 269, 272, 275, 278 add ____

2. What number was subtracted to make the sequence?

- a) 58, 56, 54, 52 subtract ____ b) 75, 70, 65, 60 subtract ____
- c) 320, 319, 318, 317 subtract ____ d) 191, 188, 185, 182 subtract ____
- e) 467, 461, 455, 449 subtract ____ f) 939, 937, 935, 933 subtract ____

3. State the rules for the following patterns:

- a) 419, 412, 405, 398, 391 subtract ____ b) 311, 319, 327, 335, 343, 351 add ____
- c) 501, 505, 509, 513 _____ d) 210, 199, 188, 177, _____
- e) 653, 642, 631, 620, 609 _____ f) 721, 730, 739, 748, 757, 766 _____
- g) 807, 815, 823, 831 _____ h) 1731, 1725, 1719, 1713, _____

4. Use the first three numbers in the pattern to find the rule. Then fill in the blanks:

- a) 52, 57, 62, 67, _____, _____ The rule is: Start at 52 and add 5
- b) 78, 75, 72, _____, _____, _____ The rule is: _____
- c) 824, 836, 848, _____, _____, _____ The rule is: _____
- d) 1 328, 1 319, 1 310, _____, _____, _____ The rule is: _____

5. **5, 11, 17, 23, 29 ...**

Tim says the pattern rule is: "Start at 5 and subtract 6 each time."

Jack says the rule is: "Add 5 each time."

Hannah says the rule is: "Start at 5 and add 6 each time."

- a) Whose rule is correct? _____
- b) What mistakes did the others make? _____

Sample pages were taken from a different edition of JUMP!



Math, so you may notice some subtle formatting/page number changes. **Patterns & Algebra 1**

The page content remains the same.

PA6-5: Introduction to T-tables

Claude creates an **increasing pattern** with squares. He records the number of squares in each figure in a chart or T-table. He also records the number of squares he adds each time he makes a new figure:

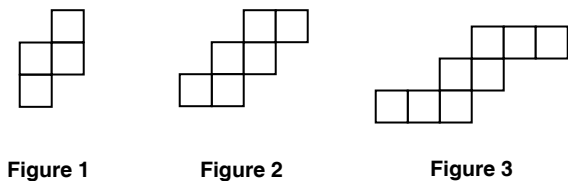


Figure	# of Squares
1	4
2	6
3	8

2 ← Number of squares added each time
2 ←

The number of squares in the figures are 4, 6, 8, ...

Claude writes a rule for this number pattern:

RULE: Start at 4 and add 2 each time.

1. Claude makes other increasing patterns with squares.

How many squares does he add to make each new figure?

Write your answer in the circles provided. Then write a rule for the pattern:

a)

Figure	Number of Squares
1	2
2	8
3	14

○
○

Rule:

b)

Figure	Number of Squares
1	3
2	9
3	15

○
○

Rule:

c)

Figure	Number of Squares
1	1
2	6
3	11

○
○

Rule:

d)

Figure	Number of Squares
1	1
2	8
3	15

○
○

Rule:

e)

Figure	Number of Squares
1	5
2	13
3	21

○
○

Rule:

f)

Figure	Number of Squares
1	11
2	22
3	33

○
○

Rule:

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g)

Figure	Number of Squares
1	3
2	12
3	21

Rule:

h)

Figure	Number of Squares
1	6
2	13
3	20

Rule:

i)

Figure	Number of Squares
1	7
2	13
3	19

Rule:

2. Extend the number pattern. How many squares would be used in Figure 6?

a)

Figure	Number of Squares
1	2
2	10
3	18

b)

Figure	Number of Squares
1	4
2	9
3	14

c)

Figure	Number of Squares
1	7
2	11
3	15

3. After making Figure 3, Claude only has 35 squares left. Does he have enough squares to complete Figure 4?

a)

Figure	Number of Squares
1	4
2	13
3	22

YES NO

b)

Figure	Number of Squares
1	6
2	17
3	28

YES NO

c)

Figure	Number of Squares
1	9
2	17
3	25

YES NO

4. In your notebook, make a T-table to show how many shapes will be needed to make the fifth figure in each pattern:

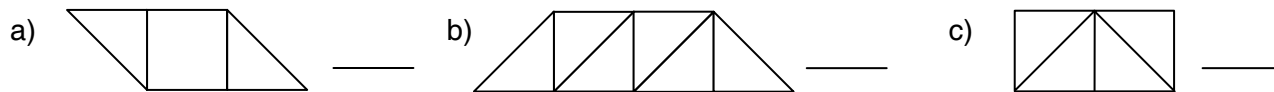
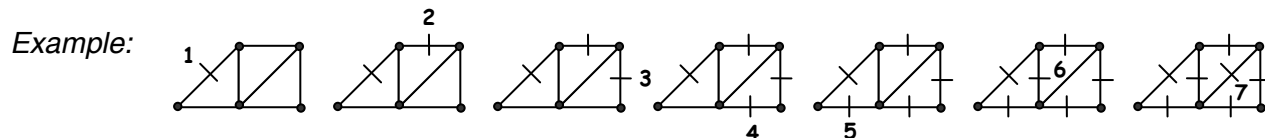
a)

b)

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1. Count the number of line segments (lines that join pairs of dots) in each set of figures by marking each line segment as you count, as shown in the example:

HINT: Count around the outside of the figure first.



2. Continue the pattern below, then complete the chart:

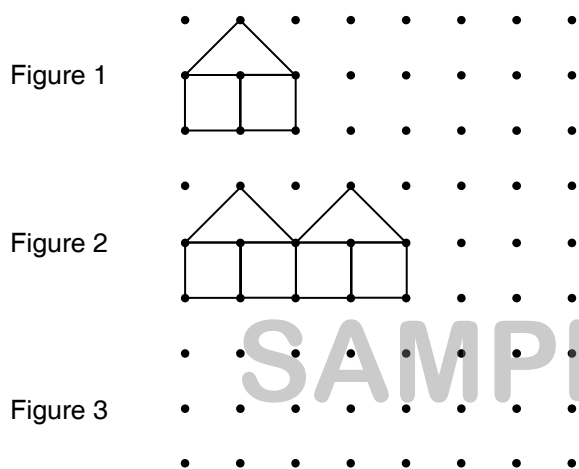


Figure	Number of Line Segments
1	
2	
3	

- a) How many line segments would Figure 4 have? _____
- b) How many line segments would you need to make a figure with 5 triangles? _____

3. Continue the pattern below, then complete the chart:

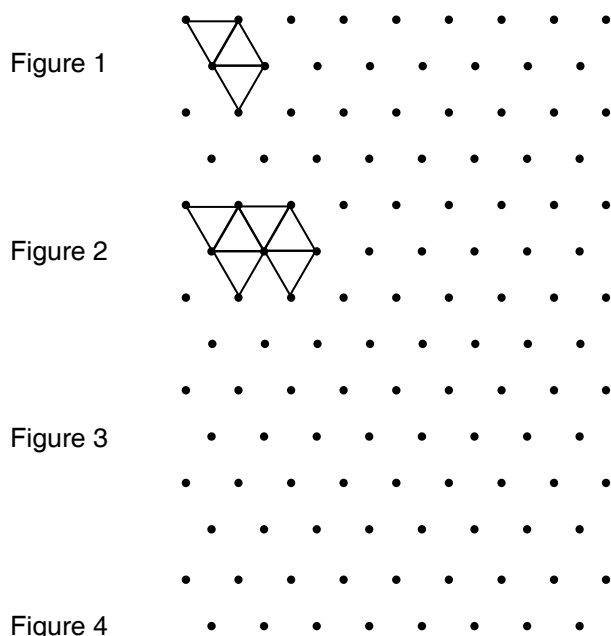


Figure	Number of Triangles	Number of Line Segments

- a) How many line segments would Figure 5 have? _____
- b) How many triangles would Figure 6 have? _____

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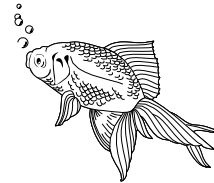
4. The snow is 17 cm deep at 5 pm.
4 cm of snow falls each hour.
How deep is the snow at 9 pm?

Hour	Depth of Snow
5 pm	17 cm

5. Philip has \$42 in savings by the end of July.
Each month he saves \$9. How much will he have by the end of October?

Month	Savings
July	\$42

6. Sarah's fish tank is leaking.
At 6 pm, there are 21 L of water in the tank.
At 7 pm, there are 18 L and at 8 pm, there are 15 L.



- a) How many litres of water leak out each hour?

- b) How many litres will be left in the tank at 10 pm?

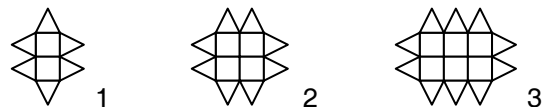
- c) How many hours will it take for all the water to leak out?

Hour	Amount of water in the tank
6 pm	21 L
7 pm	18 L
8 pm	15 L
9 pm	
10 pm	



7. A store rents snowboards at \$7 for the first hour and \$5 for every hour after that.
How much does it cost to rent a snowboard for 6 hours?

8. a) How many triangles would April need to make a figure with 10 squares?



- b) April says that she needs 15 triangles to make the sixth figure. Is she correct?

9. Merle saves \$55 in August. She saves \$6 each month after that.
Alex saves \$42 in August. He saves \$7 each month after that.
Who has saved the most money by the end of January?

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PA6-7: T-tables (Advanced)

The **terms** of a sequence are the numbers or items in the sequence.

*This is **term number 4** since it is in the fourth position.*

A **term number** gives the position of each item.

4, 7, 10, 13, 16



1. Draw a T-table for each sequence to find the given term:

- a) Find the 5th term: 3, 8, 13, 18, ... b) Find the 7th term: 42, 46, 50, 54, ...

2. Ben says that the 6th term of the sequence 7, 13, 19, ... is 53. Is he correct? Explain.

3. Find the missing terms in each sequence.

- a) 8, 12, _____, 20 b) 11, _____, _____, 26
 c) 15, _____, _____, 24, _____ d) 59, _____, _____, _____, 71

4.

Term Number	Term
1	13
2	15
3	18
4	19
5	21

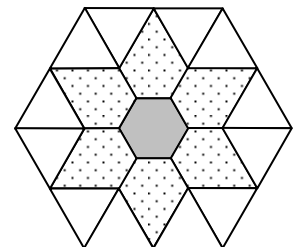
Term Number	Term
1	25
2	30
3	34
4	37
5	41

Each T-Table was made by adding a number repeatedly.

Find and correct any mistakes in the tables.

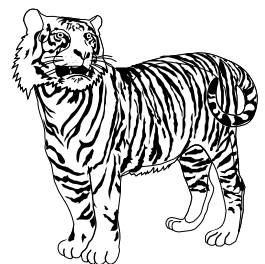
5. Rita made an ornament using a hexagon (shaded figure), pentagons (dotted) and triangles.

- a) How many pentagons does she need to make 7 ornaments?
 b) Rita used 6 hexagons to make ornaments.
 How many triangles and pentagons did she use?
 c) Rita used 36 pentagons. How many triangles did she use?



6. A newborn Siberian Tiger cub weighs 1 300 g. It gains 100 g a day.
 A newborn baby weighs 3 300 g. It gains 200 g every week.

- a) A cub and a baby are born on the same day. Who weighs more after...
 i) 2 weeks? ii) 6 weeks?



b) After how many weeks would the cub and the baby have the same weight?

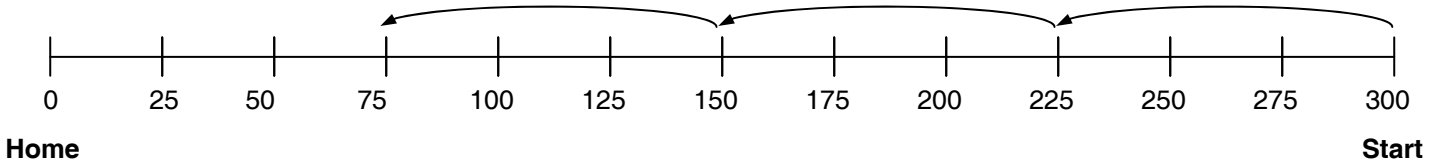
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PA6-10: Number Lines



Jacqui is on a bicycle tour 300 km from home. She can cycle 75 km each day.

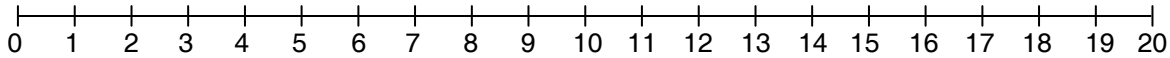
If she starts riding towards home on Tuesday morning, how far away from home will she be by Thursday evening?



On Thursday evening, she will be 75 km from home.

1. On Wednesday morning Blair's campsite is 18 km from Tea Lake. He plans to hike 5 km towards the lake each day.

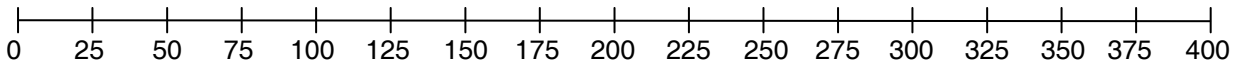
How far from the lake will he be on Friday evening? _____



2. On Saturday morning, Samantha is 400 km from her home. She can cycle 75 km each day.

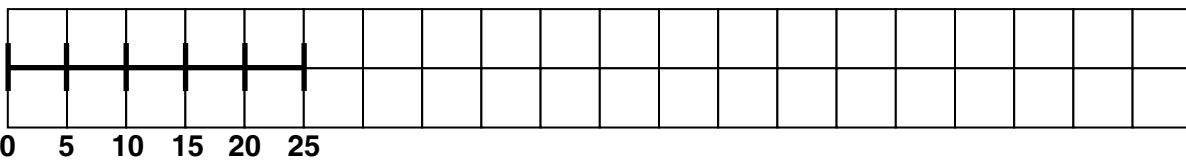
How far from home will she be on Tuesday evening? _____

SAMPLE PAGE

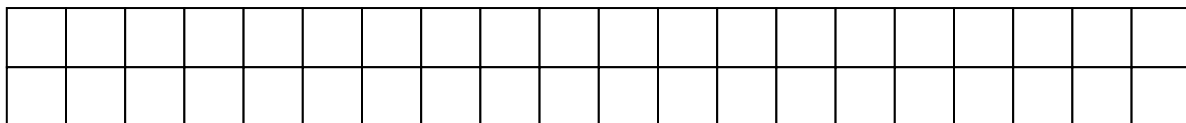


Draw and label a number line in the grid to solve the problem.

3. 15 L of water drains out of a 90 L tank each minute. How much water will be left after 5 minutes?

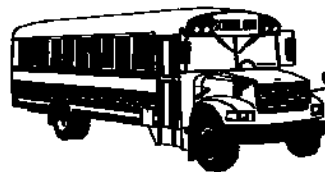


4. Brenda is 70 km from home. She can cycle towards home 15 km an hour. How far from home will she be in 3 hours?



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5. A grade six class is on a field trip 250 km from home. Their bus travels at a speed of 75 km each hour. How far from home will they be after 3 hours?



6. Paul plants 5 trees in a row. The nearest tree is 5 metres from his house. The farthest tree is 17 metres from his house. The trees are equally spaced. How far apart are the trees?

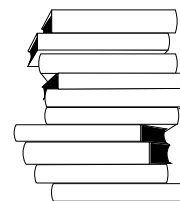


HINT: Put Paul's house at zero on the number line.

7. Michael's house is 18 metres from the ocean. He is sleeping in a chair 3 metres away from his house (toward the ocean). The tide rises 5 metres every hour. How long will it take before his feet get wet?



8. Robert's bookcase has 5 shelves. The top shelf is 150 cm above the floor and the bottom shelf is 30 cm above the floor. How far apart are the shelves?



9. Aaron is training for football. He runs 5 metres forward and 2 metres back every 4 seconds. How far from where he started will he be after 16 seconds?



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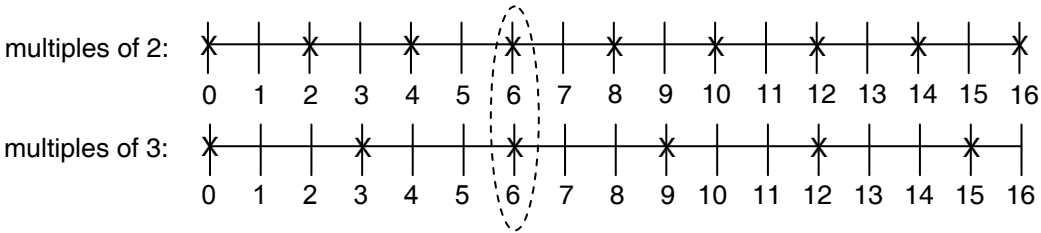
jump math
MULTIPLYING POTENTIAL

Math 8 so you may notice some subtle formatting/page number changes. Patterns & Algebra 1

The page content remains the same.

PA6-11: Lowest Common Multiples

The multiples of 2 and 3 are marked with Xs on the number lines below:



0 is a multiple of every number

The **lowest common multiple (LCM)** of 2 and 3 is 6: 6 is the least non-zero number that 2 and 3 both divide into evenly.

1. Mark the multiples of the given numbers on the number lines. What is the lowest common multiple of the pair?

a) 3: 4: LCM = _____

b) 4: 6: LCM = _____

2. Find the lowest common multiple of each pair of numbers. The first one has been done for you:
HINT: Count up by the largest number until you find a number that both numbers divide into with no remainder.

a) 3 and 5 3: 3, 6, 9, 12, 15 , 18 5: 5, 10, 15 , 20 LCM = <u>15</u>	b) 4 and 10 LCM = _____	c) 3 and 9 LCM = _____	d) 2 and 6 LCM = _____
---------------------------------------------------------------------------------------------	----------------------------	---------------------------	---------------------------



e) 2 and 10	f) 3 and 6	g) 3 and 12	h) 4 and 8	i) 8 and 10
j) 5 and 15	k) 6 and 10	l) 3 and 10	m) 6 and 8	n) 6 and 9

3. Paul visits the library every fourth day in January (beginning on January 4th).
 Werda visits every sixth day (beginning on January 6th).
 Nigel visits every 8th day (beginning on January 8th).

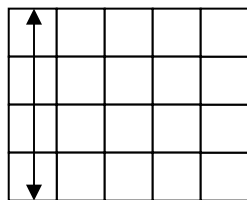


On what day of the month will they all visit the library together?

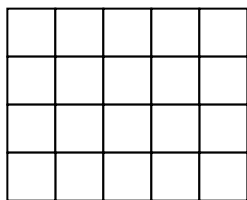
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TEACHER: Review ordinal numbers before beginning this page.

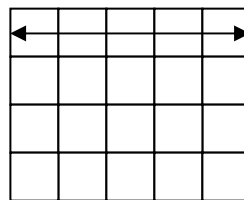


Columns run up and down.

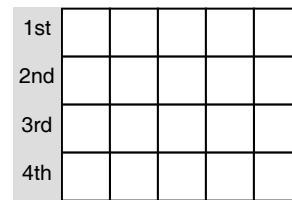


1st 2nd 3rd 4th 5th

Columns are numbered left to right (in this exercise).



Rows run sideways.



Rows are numbered from top to bottom (in this exercise).

1. Shade ...

a)

2	6	10
10	14	18
18	22	26

the 2nd row

b)

2	6	10
10	14	18
18	22	26

the 1st column

c)

2	6	10
10	14	18
18	22	26

the 3rd column

d)

2	6	10
10	14	18
18	22	26

the diagonals
(one is shaded here)



2. Describe the pattern in the numbers you see in each chart below:

NOTE: You should use the words "rows", "columns", and "diagonals" in your answer.

a)

1	3	5
5	7	9
9	11	13

b)

6	12	18	24
12	18	24	30
18	24	30	36
24	30	36	42

c)

16	20	24	28
12	16	20	24
8	12	16	20
4	8	12	16

3. Make up your own pattern and describe it:

4. Place the letters X and Y so that each row and each column has two Xs and two Ys in it:

- Which row of the chart has a decreasing pattern (looking left to right)?
- Which column has a repeating pattern?
- Write pattern rules for the first and second column.
- Describe the relationship between the numbers in the third and fourth columns.
- Describe one other pattern in the chart.
- Name a row or column that does not appear to have any pattern.

0	4	8	6	2
5	6	7	5	9
10	8	6	4	2
15	10	5	3	9
20	12	4	2	2

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1. In a magic square, the numbers in each row, column, and diagonal all add up to the same number (the “magic number” for the square):

2	9	4
7	5	3
6	1	8

What is the magic number for this square? _____

2. Complete the magic squares:

a)

2		6
9	5	
4	3	

b)

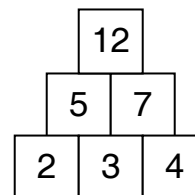
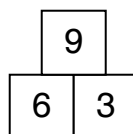
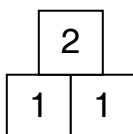
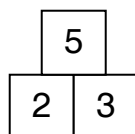
	9	
10	5	12

c)

		10
	12	
14		18



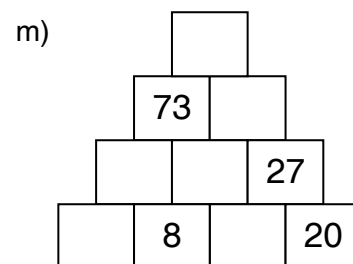
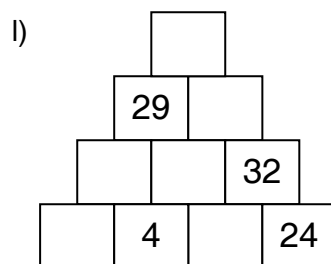
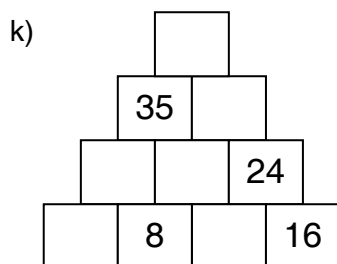
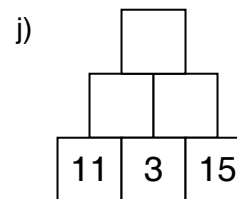
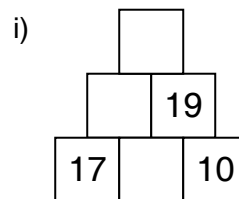
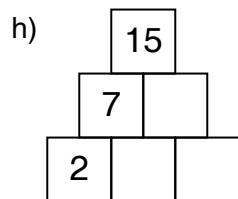
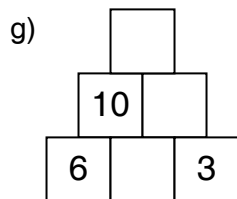
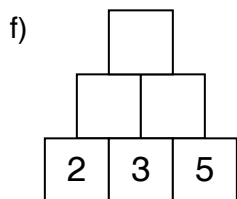
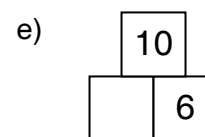
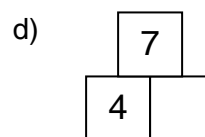
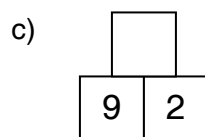
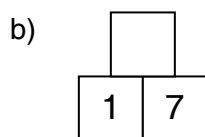
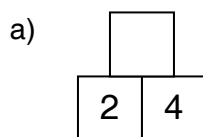
3. Here are some number pyramids:



Can you find the rule by which the patterns in the pyramids were made? Describe it here:

SAMPLE PAGE

4. Using the rule you described in Question 3, find the missing numbers:

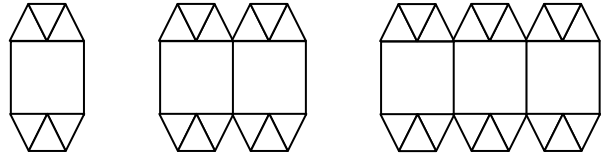


Sample pages were taken from a different edition of JUMP!



PA6-15: Finding Rules for T-tables – Part I

Andre makes a garden path using 6 triangular stones for every 1 square stone.



He writes an equation that shows how to calculate the number of triangles from the number of squares:

squares \times 6 = triangles

or (for short): **$6 \times s = t$**

Squares (s)	$6 \times s = t$	Triangles (t)
1	$6 \times 1 = 6$	6
2	$6 \times 2 = 12$	12
3	$6 \times 3 = 18$	18

1. Each chart represents a different design for a path. Complete the charts:

a)

Squares (s)	$4 \times s = t$	Triangles (t)
1	$4 \times 1 = 4$	4
2	$4 \times \square = 8$	
3	$4 \times \square = 12$	

b)

Squares (s)	$3 \times s = t$	Triangles (t)
1	$3 \times \square = 3$	
2	$3 \times \square = 6$	
3	$3 \times \square = 9$	

2. Write a rule that tells you how to calculate the number of triangles from the number of squares:

a)

Squares	Triangles
1	4
2	8
3	12

b)

Squares	Triangles
1	5
2	10
3	15

c)

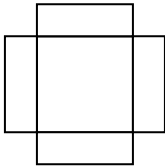
Squares	Triangles
1	2
2	4
3	6

d)

Squares	Triangles
1	6
2	12
3	18

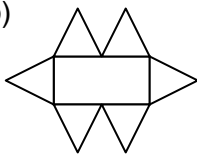
3. Wendy makes broaches using squares (s), rectangles (r), and triangles (t). Complete the chart. Write an equation (such as $4 \times s = t$) for each design:

a)



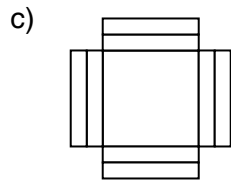
Squares (s)	Rectangles (r)
1	
2	
3	

b)

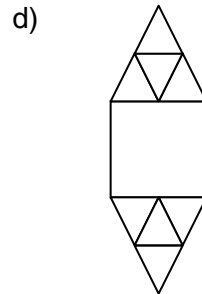


Rectangles (r)	Triangles (t)
1	
2	
3	

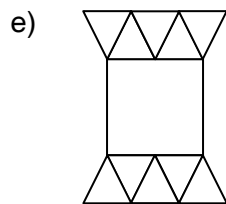
Sample pages were taken from a different edition of JUMP!



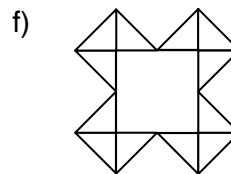
Squares (s)	Rectangles (r)



Squares (s)	Triangles (t)



Squares (s)	Triangles (t)

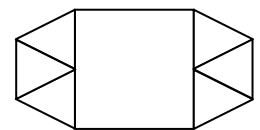


Squares (s)	Triangles (t)

4. Wendy has 39 triangles.

Does she have enough triangles to make 7 broaches using the design here?

How can you tell without making a chart?



SAMPLE PAGE

5. Create a design using squares (s) and triangles (t) to go with each equation:

a) $6 \times s = t$

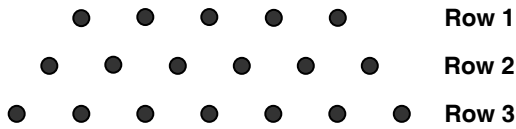
b) $5 \times s = t$

6. Create a design with squares and triangles and then write an equation for your design:

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In the auditorium, the number of chairs in each row is always 4 greater than the row number.
 Kelly writes an equation that shows how to calculate the number of chairs from the row number:

row number + 4 = number of chairs (or $r + 4 = c$ for short)



Row	$r + 4 = c$	Chairs
1	1 + 4 = 5	5
2	2 + 4 = 6	6
3	3 + 4 = 7	7

7. Each chart represents a different arrangement of chairs. Complete the charts:

a)

Row	$r + 6 = c$	Chairs
1	1 + 6 = 7	7
2	<input type="text"/> + 6 =	
3	<input type="text"/> + 6 =	

b)

Row	$r + 9 = c$	Chairs
1	<input type="text"/> + 9 =	
2	<input type="text"/> + 9 =	
3	<input type="text"/> + 9 =	

8. Say what number you must add to the row number to get the number of chairs.
 Write an equation using r for the row number and c for the number of chairs:

a)

Row	Chairs
1	5
2	6
3	7

Add 4
 $r + 4 = c$

b)

Row	Chairs
1	8
2	9
3	10

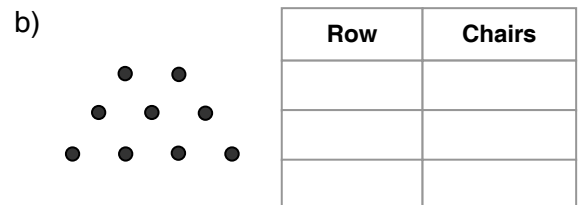
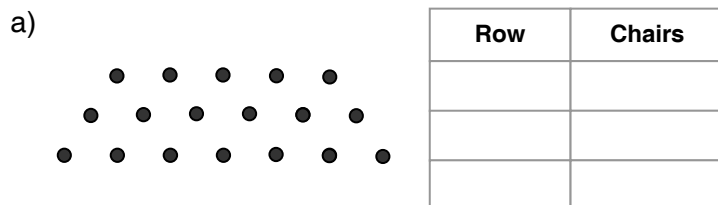
c)

Row	Chairs
1	9
2	10
3	11

d)

Row	Chairs
7	12
8	13
9	14

9. Complete the charts. Then, in the box provided, write an equation for each arrangement of chairs:



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10. Apply the given rule to the numbers in the input column. Write your answer in the output column:

a)

INPUT	OUTPUT
1	
2	
3	

Rule:

Add 4 to the input.

b)

INPUT	OUTPUT
5	
6	
7	

Rule:

Subtract 4 from the input.

c)

INPUT	OUTPUT
3	
5	
6	

Rule:

Multiply the input by 6.

d)

INPUT	OUTPUT
32	
8	
40	

Rule:

Divide each input by 4.

e)

INPUT	OUTPUT
18	
19	
20	

Rule:

Add 10 to the input.

f)

INPUT	OUTPUT
4	
5	
6	

Rule:

Multiply the input by 8.

SAMPLE PAGE

11. For each chart, give a rule that tells you how to make the output numbers from the input numbers.

a)

INPUT	OUTPUT
2	6
3	7
4	8

Rule:

b)

INPUT	OUTPUT
3	8
5	10
7	12

Rule:

c)

INPUT	OUTPUT
1	7
2	14
3	21

Rule:

d)

INPUT	OUTPUT
3	15
2	10
1	5

Rule:

e)

INPUT	OUTPUT
2	16
4	32
6	48

Rule:

f)

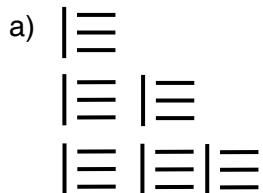
INPUT	OUTPUT
19	16
15	12
21	18

Rule:

Sample pages were taken from a different edition of JUMP!

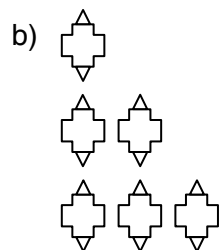
1. Complete the T-table for each pattern.

Then write a rule that tells you how to calculate the second number from the first number.



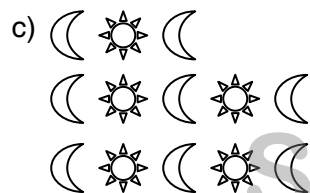
Number of Vertical Lines	Number of Horizontal Lines

Rule:



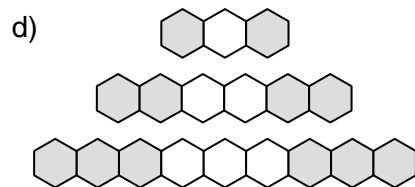
Number of Crosses	Number of Triangles

Rule:



Number of Suns	Number of Moons

Rule:



Number of Light Hexagons	Number of Dark Hexagons

Rule:

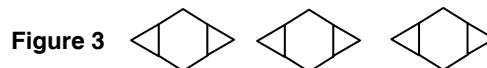
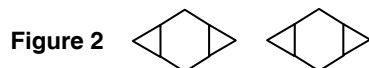
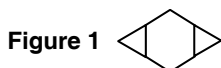


Number of Diamonds	Number of Stars

Rule:



2. Make a T-table and write a rule for the number of hexagons and triangles:



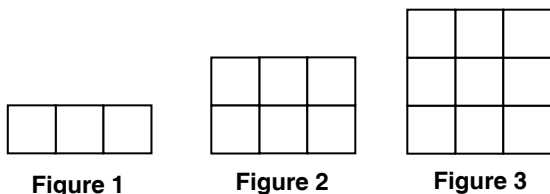
3. How many triangles are needed for 9 hexagons in the pattern in Question 2? How do you know?

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Fill in the chart and write a rule for the number of blocks in each figure, as shown in part a).

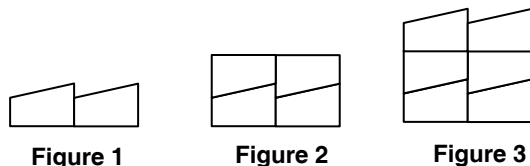
1. a)



Rule: $3 \times \text{Figure Number}$

Figure Number	Number of Blocks
1	
2	
3	

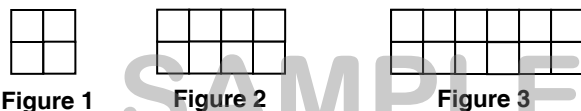
b)



Rule: _____

Figure Number	Number of Blocks

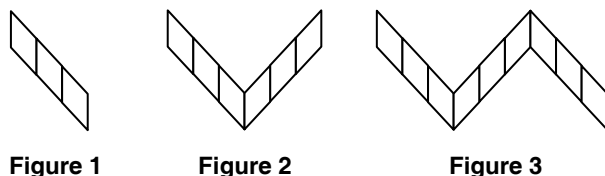
c)



Rule: _____

Figure Number	Number of Blocks

d)



Rule: _____

Figure Number	Number of Blocks

In each example above, you can find the **total number of blocks** by *multiplying* the **Figure Number** by the **number of blocks in the first figure**.
 In such cases, **the number of blocks** is said to vary directly with the Figure Number.

2. Circle the sequences where the number of blocks varies directly with the Figure Number:

a)

Figure Number	Number of Blocks
1	3
2	6
3	9

b)

Figure Number	Number of Blocks
1	4
2	7
3	10

c)

Figure Number	Number of Blocks
1	6
2	12
3	18

d)

Figure Number	Number of Blocks
1	5
2	10
3	16

Sample pages were taken from a different edition of JUMP!

1. In each pattern below, the number of *shaded* blocks increases directly with the Figure Number. The *total* number of blocks, however, does not increase directly.

- i) Write a rule for the number of *shaded* blocks in each sequence.
- ii) Write a rule for the *total number* of blocks in each sequence.

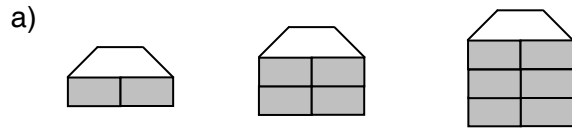


Figure 1 Figure 2 Figure 3

Rule for the number of shaded blocks:

2 × Figure Number

Rule for the total number of blocks:

2 × Figure Number + 1

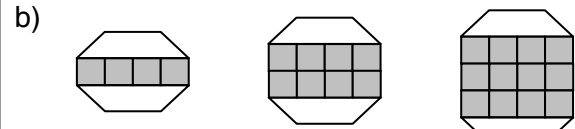


Figure 1 Figure 2 Figure 3

Rule for the number of shaded blocks:

Rule for the total number of blocks:

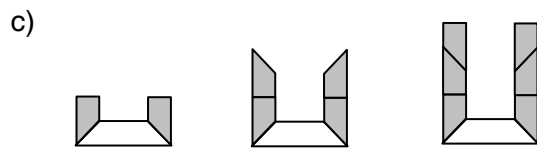


Figure 1 Figure 2 Figure 3

Rule for the number of shaded blocks:

Rule for the total number of blocks:

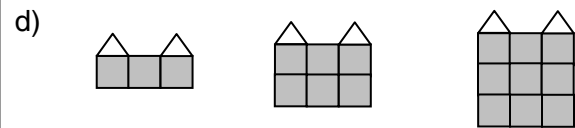


Figure 1 Figure 2 Figure 3

Rule for the number of shaded blocks:

Rule for the total number of blocks:

e) Rule for the number of shaded blocks:

Rule for the total number of blocks:

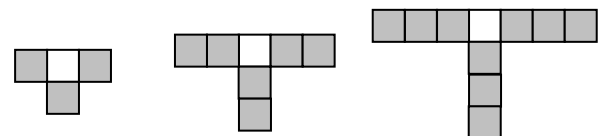


Figure 1 Figure 2 Figure 3



2. Draw or build a sequence of figures that might go with the following tables. Shade the part of each figure that varies directly with the Figure Number:

a)

Figure Number	Number of Blocks
1	5
2	7
3	9

b)

Figure Number	Number of Blocks
1	6
2	10
3	14

c)

Figure Number	Number of Blocks
1	7
2	10
3	13

Sample pages were taken from a different edition of JUMP!

1. Fill in the chart using the rule.

a) Rule: Multiply by 4 and add 3

INPUT	OUTPUT
1	
2	
3	

Gap: _____

b) Rule: Multiply by 2 and add 3

INPUT	OUTPUT
1	
2	
3	

Gap: _____

c) Rule: Multiply by 5 and add 4

INPUT	OUTPUT
1	
2	
3	

Gap: _____

d) Rule: Multiply by 10 and add 1

INPUT	OUTPUT
1	
2	
3	

Gap: _____

e) Compare the **gap** in each pattern above to the rule for the pattern. What do you notice?

SAMPLE PAGE



2. For each pattern below, make a T-table as shown.

Fill in the total number of blocks (shaded and unshaded) and the gap.

Can you predict what the gap will be for each pattern before you fill in the chart?

Figure Number	Number of Blocks
1	
2	
3	

Figure 1

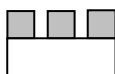


Figure 2

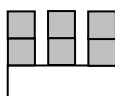


Figure 3

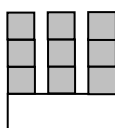


Figure 1

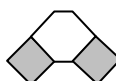


Figure 2

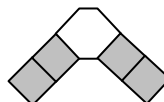


Figure 3

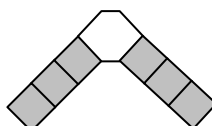


Figure 1

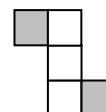


Figure 2

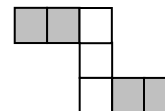
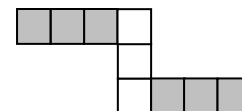


Figure 3



Can you write a rule for each pattern that tells how to find the number of blocks from the figure number?

Sample pages were taken from a different edition of JUMP!

PA6-20: Finding Rules for T-tables – Part II

In the T-table shown here, the output is calculated from the input by two operations:

INPUT	OUTPUT
1	5
2	8
3	11

To find the rule:

Step 1:

Find the step (or gap) between the numbers in the OUTPUT column.

Step 2:

Multiply the INPUT numbers by the gap.

Step 3:

What must you add to each number in the second column?

INPUT	INPUT x GAP	OUTPUT
1		5
2		8
3		11

3
3

INPUT	INPUT x GAP	OUTPUT
1	3	5
2	6	8
3	9	11

3
3

INPUT	INPUT x GAP	OUTPUT
1	3	5
2	6	8
3	9	11

3
3

Add 2

Step 4:

Write a rule for the T-table – **Rule:** Multiply the input by 3 and add 2

1. Use the steps above to find the rule that tells you how to calculate the OUTPUT from the INPUT:

a)

INPUT	INPUT x GAP	OUTPUT
1		9
2		13
3		17

Add _____

Rule: Multiply by _____ then add _____.

b)

INPUT	INPUT x GAP	OUTPUT
1		3
2		5
3		7

Add _____

Rule: Multiply by _____ then add _____.

c)

INPUT	INPUT x GAP	OUTPUT
1		7
2		10
3		13

Add _____

Rule: Multiply by _____ then add _____.

d)

INPUT	INPUT x GAP	OUTPUT
1		6
2		8
3		10

Add _____

Rule: Multiply by _____ then add _____.

Sample pages were taken from a different edition of JUMP!

2. Write a rule that tells you how to calculate the OUTPUT from the INPUT:

a)

INPUT	INPUT x GAP	OUTPUT
1		9
2		14
3		19

Multiply by _____ then add _____.

b)

INPUT	INPUT x GAP	OUTPUT
1		12
2		18
3		24

Multiply by _____ then add _____.

c)

INPUT	INPUT x GAP	OUTPUT
1		6
2		10
3		14

Multiply by _____ then add _____.

d)

INPUT	INPUT x GAP	OUTPUT
1		6
2		11
3		16

Multiply by _____ then add _____.

3. Write the rule that tells you how to calculate the OUTPUT from the INPUT:

NOTE: In this case you will have to subtract rather than add.

a)

INPUT	INPUT x GAP	OUTPUT
1		4
2		9
3		14

Multiply by _____ then subtract _____.

b)

INPUT	INPUT x GAP	OUTPUT
1		1
2		4
3		7

Multiply by _____ then subtract _____.

c)

INPUT	INPUT x GAP	OUTPUT
1		2
2		6
3		10

Multiply by _____ then subtract _____.

d)

INPUT	INPUT x GAP	OUTPUT
1		5
2		11
3		17

Multiply by _____ then subtract _____.

Sample pages were taken from a different edition of JUMP!



4. Write a rule that tells you how to make the Output from the Input:
Each rule may involve either one or two operations.

a)

Input	Output
1	2
2	7
3	12
4	17

Rule:

b)

Input	Output
1	3
2	9
3	15
4	21

Rule:

c)

Input	Output
1	5
2	6
3	7
4	8

Rule:

d)

Input	Output
1	7
2	9
3	11
4	13

Rule:

e)

Input	Output
0	4
1	8
2	12
3	16

Rule:

f)

Input	Output
1	4
2	8
3	12
4	16

Rule:

SAMPLE PAGE

BONUS

5. Find the rule by guessing and checking.

a)

Input	Output
5	27
6	32
7	37
8	42

Rule:

b)

Input	Output
4	7
5	9
6	11
7	13

Rule:

c)

Input	Output
57	63
58	64
59	65
60	66

Rule:

d)

Input	Output
2	7
4	13
6	19
8	25

Rule:

e)

Input	Output
10	31
9	28
3	10
1	4

Rule:

f)

Input	Output
8	13
4	5
3	3
7	11

Rule:

Sample pages were taken from a different edition of JUMP!



Math, so you may notice some subtle formatting/page number changes.

The page content remains the same.

PA6-21: Applying Rules for Patterns

1. For each, draw Figure 4 and fill in the T-table.
Then write a rule that tells you how to calculate the input from the output:

a) 1 2 3 4

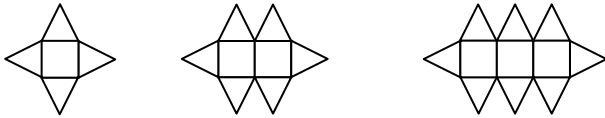


Figure	Number of Triangles
1	
2	
3	
4	

Rule for T-table: _____

Use your rule to predict how many triangles will be needed for Figure 9: _____

b) 1 2 3 4

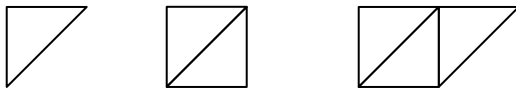


Figure	Number of Line Segments
1	
2	
3	
4	

Rule for T-table: _____

Use your rule to predict the number of line segments in Figure 11: _____

SAMPLE PAGE

c) 1 2 3 4

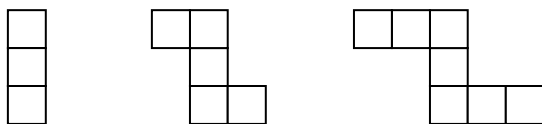


Figure	Number of Squares
1	
2	
3	
4	

Rule for T-table: _____

Use your rule to predict the number of squares needed for Figure 10: _____

d) 1 2 3 4

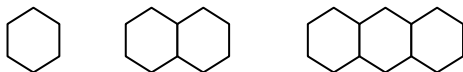


Figure	Perimeter
1	
2	
3	
4	

Rule for T-table: _____

Use your rule to predict the perimeter of Figure 23: _____

Sample pages were taken from a different edition of JUMP!