

Section 1.4 Relationships in patterns

Enviro-Challenge Day

Mrs. Moody's class pledges to pick up 6 pieces of garbage each.

Warm up Grade 7

Oct. 24, 2022

What is the variable to determine how many pieces of garbage gets picked up?

*The number of students is the variable

How many pieces will get picked up when the number of students is 5? 10? 15? ...

You can use a chart to help figure this out.

Number of Students	5	10	15	20	25	30	n
Pieces of Garbage	30	60	90	120	150	180	$6n$

What pattern do you see in the number of pieces of garbage.

* It is increasing by 30

As the # of students increase by 5, Garbage increase by 30.

Write a rule to find how many pieces of garbage will be picked up, when you know the number of students.

* multiply the number of students by 6Write an algebraic expression for the number of pieces of garbage picked up by n students.* $6 \times n$ or $6n$

Key words \rightarrow # that goes with
variable

for each

for every

per

multiply

Ex)

\$5 / person

5p let $p \equiv$ person

Mrs. Waugh's class pledges to pick up a total of 10 more pieces of garbage than Mrs. Moody's class.

Number of Students	2	4	6	8	10	n
Number of pieces of garbage by Mrs. M's class	12	24	36	48	60	6n
Number of pieces of garbage by Mrs. W's class	22	34	46	58	70	6n + 10

n represents the number of students

The number of pieces of garbage is related to the number of students.

When we compare or relate a variable to an expression that contains a variable, we have a **relation**.

Example

Mr. Prasad plans to hold a party for a group of his friends. The cost of renting a room is \$35. The cost of food is \$4 per person.

key word
per each

(a) Write a relation for the cost of the party in dollars for n people.

Use a chart to help you find the answer.

remember
cost of food + cost of rent

Number of People	0	5	10	15	20
Cost of Party	35	55	75	95	115

n = 15 } n = 20

Relation

$4n + 35$

Food + Room
 4×5
 $20 + 35$

(b) How much will a party cost for 10 people? For 30 people? For 50 people?

n = 10
 $4n + 35$
 $4(10) + 35$
 $40 + 35$
75

n = 30
 $4n + 35$
 $4(30) + 35$
 $120 + 35$
155

n = 50
 $4n + 35$
 $4(50) + 35$
 $200 + 35$
\$ 235

We did #1(a, b) as a group

Homework pg. 23 # 1(c,d)
2 (a,b,c,d)
3(a,b)

2a) $n \equiv \# \text{ of students}$
 $3n$

For each }
For every } # that
per / } goes
with
variable

b) $n+2$
 $n=1$ } $n=2$
 $1+2$ } $2+2$
 3 } 4
 $n=3$
 $3+2$
 5

1a)

n Term #	1	2	3	4	5	6
Term	2	4	6	8	10	12

$\xrightarrow{+1}$ $\xrightarrow{+1}$ $\xrightarrow{+1}$
 $\xrightarrow{+2}$ $\xrightarrow{+2}$ $\xrightarrow{+2}$

\downarrow
 $2n$

A term # increases by 1, Term increased by 2.

Check $\frac{n=1}{2(1)}$
 $\frac{2}{2}$ ✓

1b)

Term #	1	2	3	4	5	6
Term	3	4	5	6	7	8

n (above 1) n (above 2) n (above 3) n (above 4) n (above 5) n (above 6)

$4P1$ (under 3) $4P1$ (under 4) $4P1$ (under 5)

$1n + 2$

As term # increases by 1,
Term increases by 1.

for $n=1$ Term 3
 $1n + 2$
 $\sqrt{1x1}$
 $1 + 2$
 Need to add 2 to get 3

c)

Term # n	1	2	3	4	5
Term	8	16	24	32	40

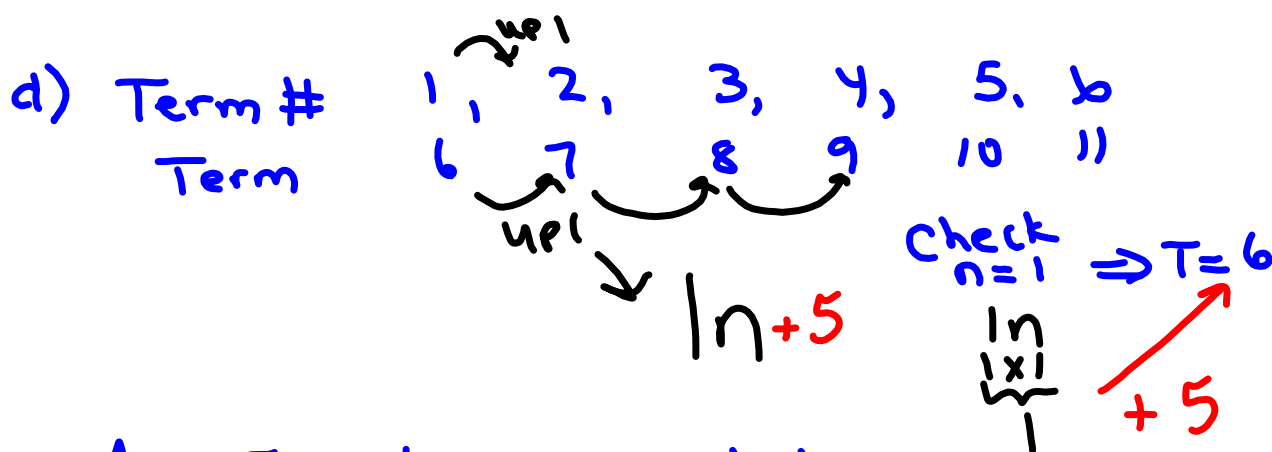
4×8

$8n$

$n=1 \quad T=8$

$\frac{8(1)}{8}$ ✓

As term # increases by 1,
the term increases by 8.



As Term # increases by 1,
 Term increases by 1. $n+5$

n	1	2	3	4	5	6
Out	8	11	14	17	20	23

Handwritten annotations:

- Red arrows connect 8 to 11, 11 to 14, and 14 to 17.
- Red text "4P 3" is written below the arrow between 8 and 11.
- A red arrow points from the "4P 3" text to the equation $3n + 5$.

In x	1	2	3	4	5
out y	8	18	28	38	48

\uparrow UP by 10
 \downarrow
 $10n - 2$
 $10(1) - 2$
 $10 - 2$
 8