2008 Grade 6 Mathematics

This is an unofficial translation of 2008 Japanese Achievement Test. Original may be found at
https://www.nier.go.jp/08tyousa/08mondai_03.pdf
and
https://www.nier.go.jp/08tyousa/08mondai_04.pdf

2008 Problem Set A

[1] Calculate the following.

(1) $132 - 124$

(2) 52×41

(3) $6 + 0.5$

(4) $68.4 \div 36$

(5) $3 + 2 \times 4$

(6) $2 \div 3$ (Express the quotient as a fraction.)

[2] Answer the following questions.

(1) Write the number that is made up of six 10's, eight 1's and three 0.1's.

(2) $\frac{7}{10}$ is the same size as which of the following? Select one from **1** through **4** below and write the number.

1	70
2	7
3	0.7
4	0.07

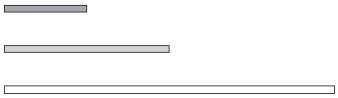
[3] In the 4 expressions below, ◍ represents a number that is not 0.

Select all calculations from **1** through **4** below whose results are greater than the number represented by ◍ and write their numbers.

1. ◍ × 1.2
2. ◍ × 0.7
3. ◍ ÷ 1.3
4. ◍ ÷ 0.8

[4] There are 3 tapes. The lengths of the tapes are as follows.

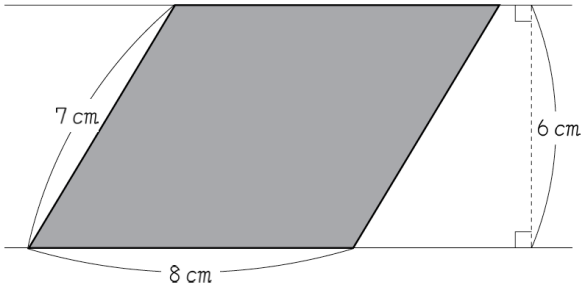
- The length of the red tape is 3 m.
- The length of the blue tape is 6 m.
- The length of the yellow tape is 12 m.



(1) How many times as long is the yellow tape as the red tape? Write the expression for the calculation and the answer.

(2) How many times as long is the blue tape as the yellow tape? Write the expression for the calculation and the answer.

[5] Write the expression to calculate the area of the following parallelogram and write the answer.



[6] Answer the following questions.

(1) Select an item whose weight is about 1 kg from **1** through **4** below and write the number.

1 An empty school back pack
2 A 1-yen coin
3 The total weight of 5-layer vaulting box
4 A handkerchief

(2) Select an item whose area is about 150 cm^2 from **1** through **4** below and write the number.

1 The area of a postage stamp.
2 The area of a New Year's postcard.
3 The area of the front cover of a mathematics textbook.
4 The floor area of a classroom.

[7] The value of *pi* can be calculated by

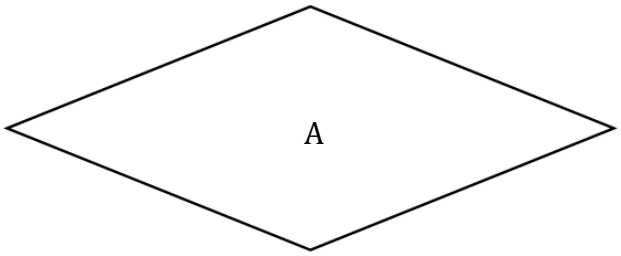
Circumference ÷ ☐

Select the appropriate phrase that will go ☐ into from **1** through **4** below and write the number.

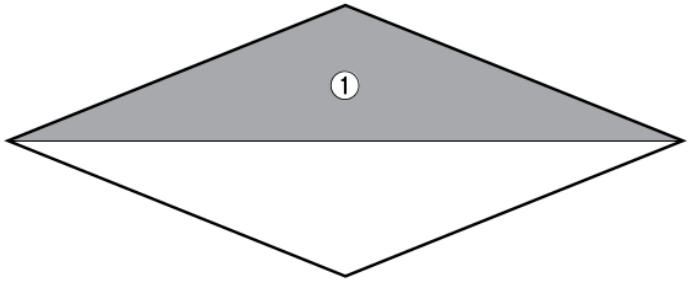
1 the length of the radius
2 the length of the diameter
3 the length of the circumference

4 the area of the circle

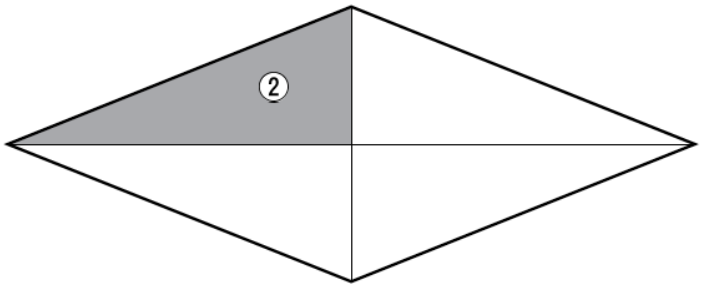
[8] There is Rhombus A as shown below.



(1) We will cut Rhombus A along a diagonal as shown below.
Write what type of the triangle is formed as shown in region (1).

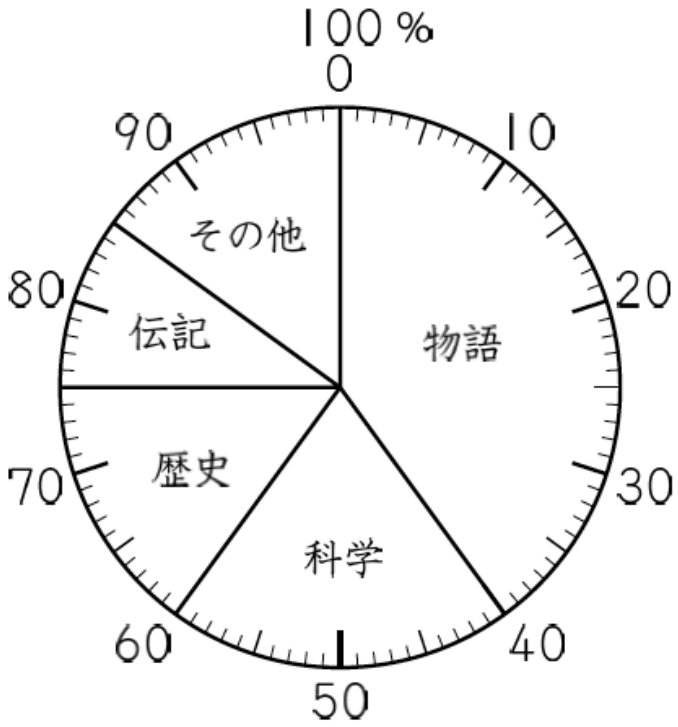


(2) We will cut Rhombus A along 2 diagonals as shown below.
Write what type of the triangle is formed as shown in region (2).



[9] We investigated the books that were checked out from the library at Akira's school in March. The circle graph below represents the proportions of the number of books in different categories that were checked out.

Proportions of books checked out in March by categories



>>> Categories in the clockwise starting from the largest segment: Fiction, Science, History, Biography, Others <<<

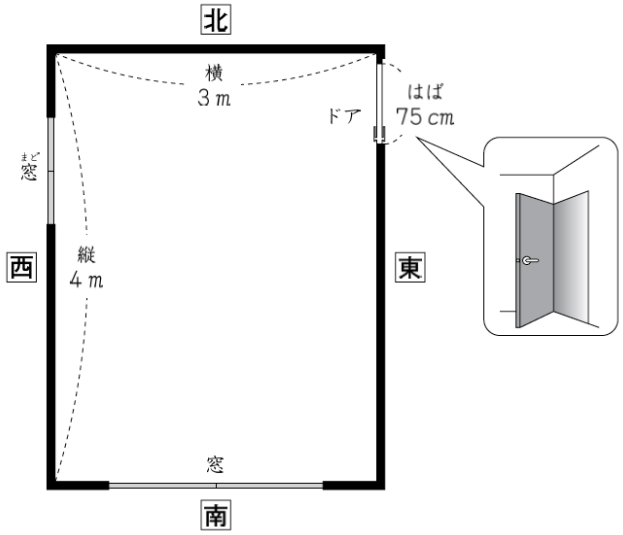
(1) What % of the checked out books were "Science" books? Write the answer.

(2) The number of checked out books in March was 620, and 40% were "Fiction" books. How many "Fiction" books were checked out? Write the answer and the expression to calculate the answer.

2008 Problem Set B

[1] There is a rectangular room with the length of 4 m and the width of 3 m as shown below. On the east side of the room, there is a door. The width of this door is 75 cm, and it swings toward the inside of the room.

Takako is planning to place various items in the room.



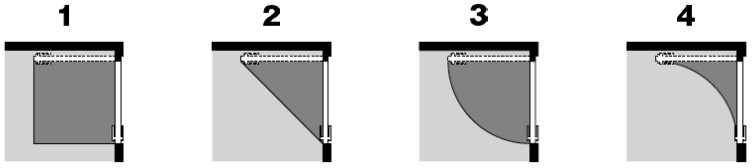
{notes on the figure}
Inside boxes, they have North, East, South, and West (in the usual map orientation).

Above the measurements, they have the “length 4m” and “width 4m”.

On the West side, there is a "Window." On the East side, there is "Door" (written inside the rectangle) and "Width (and 75cm below)" on the outside. On the South side, there is a "Window," also.

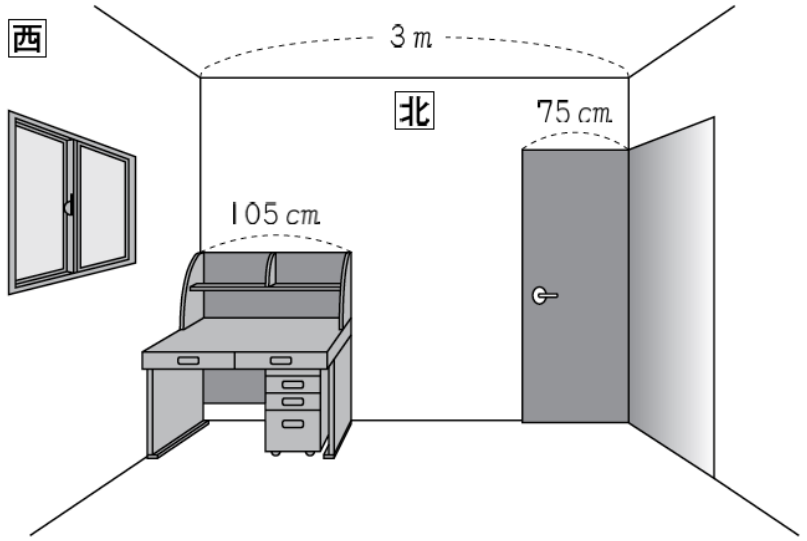
(1) We are going to find out the location where if we place something it will be hit by the door when it is opened or closed.

If we show the region where the door will hit any object using and the region where the door will not hit any object using ,



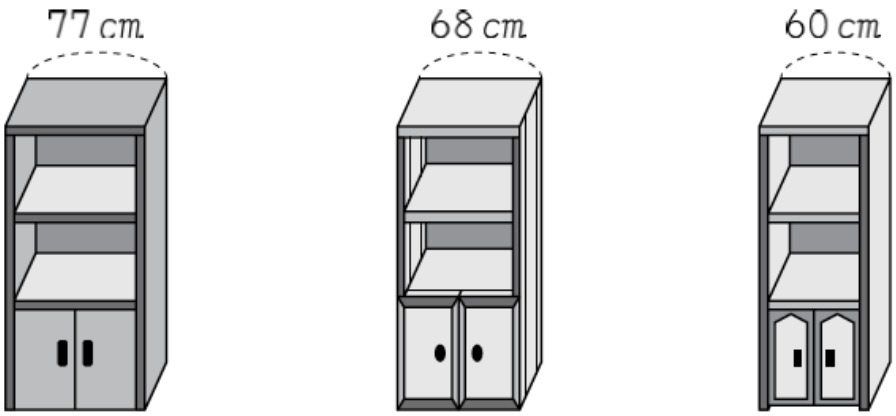
which of the following **1** through **4** shows these regions correctly? Select the correct one and write the number.

(2) Takako placed a desk against the North and the West wall as shown in the figure below.

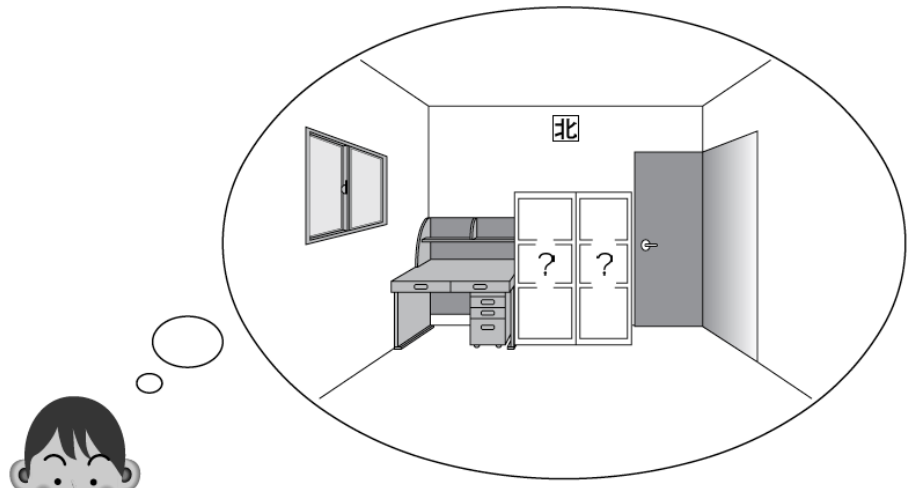


>>> On the left wall, "West," and on the front "North" <<<

At Takako's house, there are 3 shelves with different widths as shown in the next figure.



Takako is thinking about picking 2 of the 3 shelves and place them in **the location where they will not get in the way of the door** as shown below.



Takako

Then, her sister said the following.

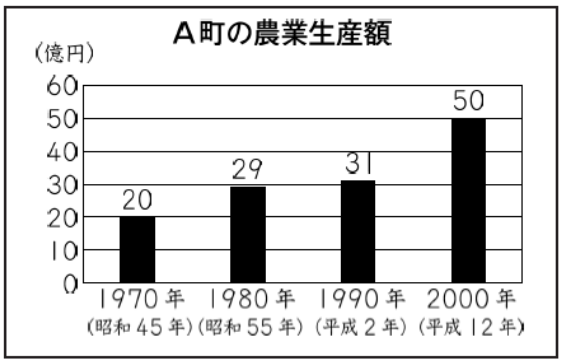
Sister

No matter which 2 shelves you pick from the 3, they will get in the way of the door, won't they?

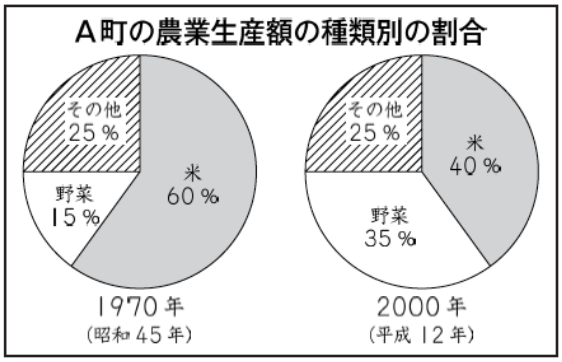
Write the reason why Takako's sister's statement, " No matter which 2 shelves you pick from the 3, they will get in the way of the door," is correct using expressions and words.

[2] Hiroshi's investigating the agricultural production value of Town A where he lives using the following 2 sets of data.

The bar graph represents the agricultural production values every 10 years since 1979.



The circle graphs show the proportions of agricultural production values by categories in 1970 and 2000.



>>>[The graph above]

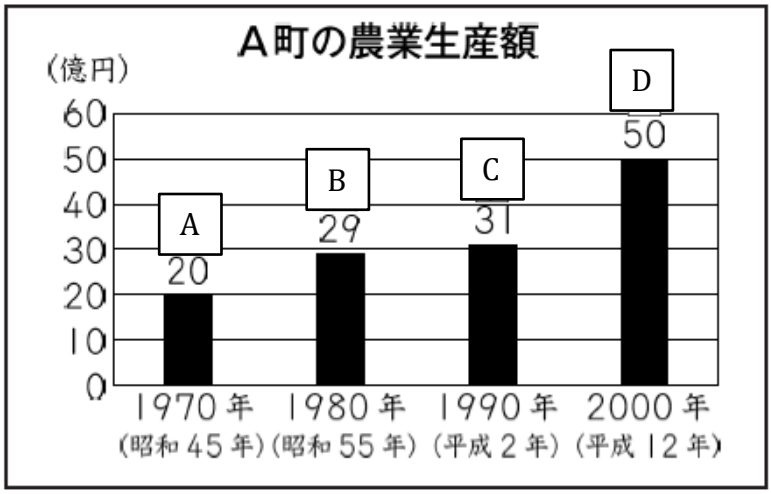
Title of the graph at the top: Agricultural Production Value of Town A
Above the vertical axis: (100 Million-Yean)
Horizontal axis: The years (1970, etc.)

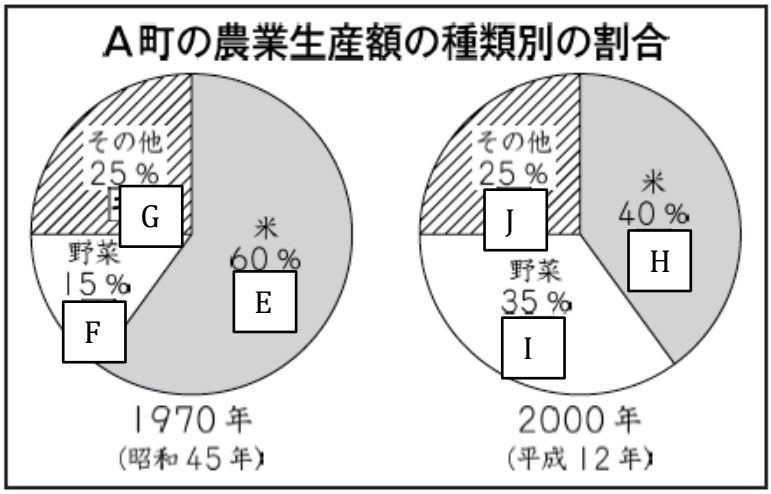
>>> [The graph below]

Title of the graph: Proportions of Agricultural Production Values of Town A by Categories
In each circle: gray section: Rice, white section: Vegetables, shaded section: Others.

(1) How many yen was the agricultural production value of Town A in 1980? Write your answer.

(2) As shown below, parts of the bar graph and the circle graphs showing agricultural production values or proportions have been labeled **A** through **J**.
In order to determine the vegetable production value in 2000, which of **A** through **J** from the data are needed. Select 2 from **A** through **J** and write the letters.





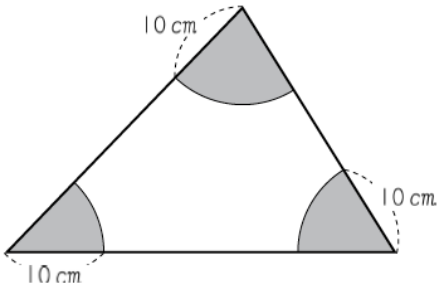
(3) Next, we are going to think about rice.
About the rice production values of Town A in 1970 and 2000, Hiroshi said the following.

Since the proportions for rice decreased from 60% to 40%, the rice production value has decreased.

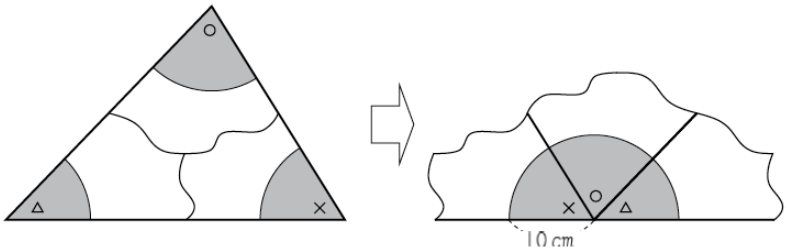
Hiroshi

Is what Hiroshi said true? Circle either "True" or "Not true." Then, explain the reason using words and expressions.

[3] As shown in the figure below, we drew a part of a circle with the radius of 10 cm at each vertex of a triangle and shaded in black.



As shown in the figure below, when the triangle was torn into three pieces and re-arranged so that the vertices are matched up, the parts of a circle shaded in black formed a figure that is a half of a circle.

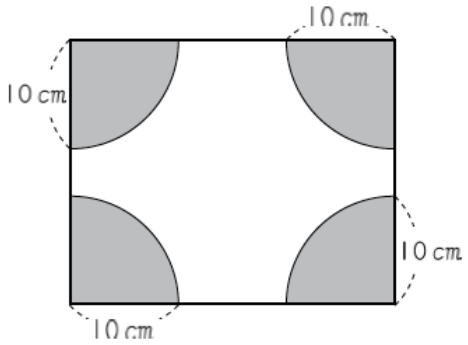


Because the sum of the angles in a triangle is 180°, the parts that are shaded in black will form a shape that is a half of a circle.

(1) Select the expression that will calculate the area of the figure formed by the 3 parts that are shaded in black from **1** through **4** below and write the number.
Use 3.14 as the value of *pi*.

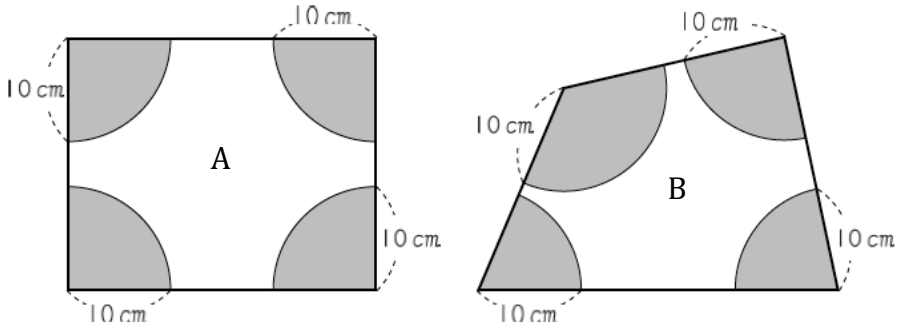
1 10 × 2 × 3.14
2 10 × 10 × 3.14
3 10 × 2 × 3.14 ÷ 2
4 10 × 10 × 3.14 ÷ 2

(2) Next, as shown in the figure on the right, at each vertex of a rectangle, a part of a circle with the radius of 10 cm was drawn and shaded in black.



How many times as much is the area of the 4 black parts of the rectangle combined as the 3 black parts of the triangle in the previous question? Write your answer.

(3) Next, a part of a circle with the radius 10 cm is drawn at each vertex of Rectangle A and Quadrilateral B and shaded in black as shown below.



What can we say if we compared the area of the 4 black parts of Rectangle A combined and the 4 black parts of Quadrilateral B combined? Select one correct statement from **1** through **3** below and write the number. Also, write the reason you chose that number by using words and expressions.

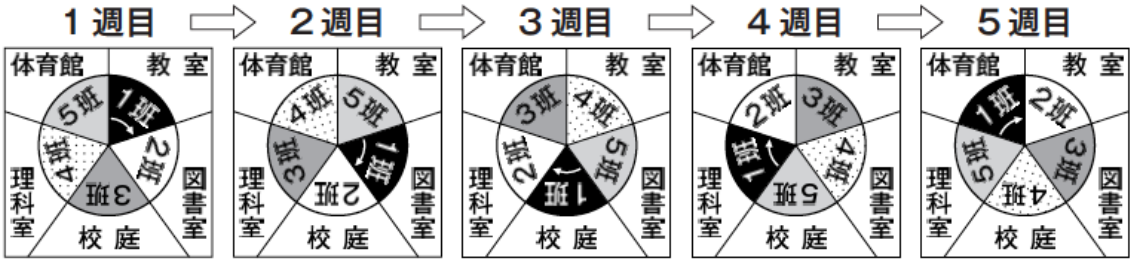
1 The area of the 4 black parts will be larger for Rectangle A.
2 The area of the 4 black parts will be equal.
3 The area of the 4 black parts will be larger for Quadrilateral B.

[4] Manami's class clean 5 different locations at her school by rotating them among 5 groups.

So, the class created the wheel shown on the right to display the cleaning rotation. The wheel in the center can be turned.

>>> {explanation of the figure}
Title: "Cleaning Rotation Wheel"
In the circle, "Group 1" (or Gp. 1), "Group 2," ... "Group 5"
Group 1 is currently at "Classroom"
Group 2 is currently at "Library"
Group 3 is currently at "Playground"
Group 4 is currently at "Science Room"
Group 5 is currently at "Gym"

The cleaning period starts in the first week of the first term. The groups will change the locations after 1 week. Starting the second week, the wheel in the center is turned clockwise one slot.



>>> {at the top} Week 1 --> Week 2 --> .... --> Week 5
{The figure is the same except the wheel in the middle rotates clockwise.}

(1) In Week 7, the Cleaning Rotation Wheel will look the same as which one of the week 1 through week 5 Cleaning Rotation Wheel? Select from **1** through **5** below and write the number.

1 Week 1
2 Week 2
3 Week 3
4 Week 4
5 Week 5

(2) Manami belongs to Group 1.
According to the school calendar, there are 15 weeks in the first term. She is figuring out all the weeks when Group 1 will be cleaning the classroom.

Week 1

Manami figured it out using an expression as follows.

Manami's strategy

The first time Group 1 cleans the classroom is **Week 1**.
The Cleaning Rotation Wheel will make a full turn in 5 weeks.
Therefore, the next time Group 1 will clean the classroom can be found by,

1 + 5 × (Number of full turns made by the wheel).

By using this expression, we see the following.

$1 + 5 \times 0 = 1$
$1 + 5 \times 1 = 6$
$1 + 5 \times 2 = 11$
$1 + 5 \times 3 = 16$

Because there are only 15 weeks in the first term, there is no cleaning in Week 16.

From this, we can conclude that Group 1 will clean the classroom in the first term during
Week 1, Week 6, and Week 11.

Next, **using Manami's strategy**, we are going to find all the weeks when Group 1 is cleaning the playground.
In the Solution Method, write a number in ☐, words and expressions in ┌┈┈┐, and words in ( ). Write your answers on the answer sheet.

Solution Method

The first time Group 1 cleans the classroom is **Week** ☐.
The Cleaning Rotation Wheel will make a full turn in 5 weeks.
Therefore, the next time Group 1 will clean the classroom can be found by,

☐ **+ 5 × (Number of full turns made by the wheel).**

By using this expression, we see the following.

Write your answer on the answer sheet.

From this, we can conclude that Group 1 will clean the classroom in the first term during
( ).

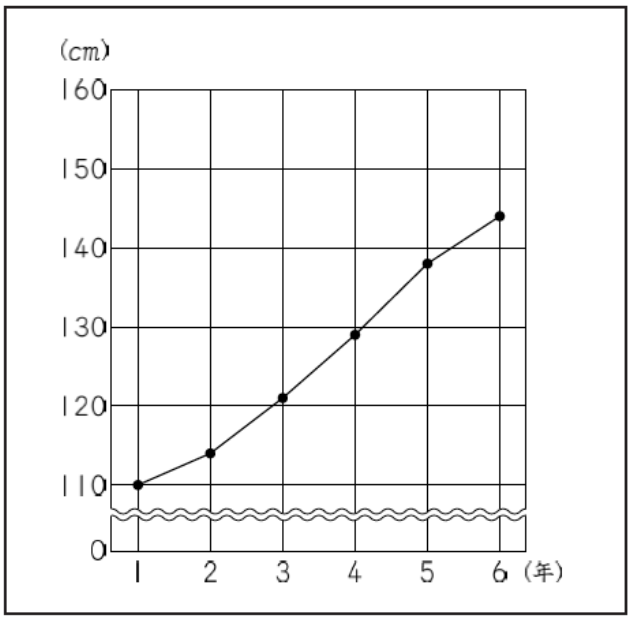
[5] At Yohei's school, they measure the heights of all students every April.
In the Health Science lesson, Yohei summarized his heights across the years in a table as shown.

Yohei's height across the years

Grade	1	2	3	4	5	6
Height (cm)	110	114	121	129	138	144

Then, from the table, he represented his heights in a broken line graph below.

Yohei's heights across the years



>>> on the horizontal axis, "(Grade)" <<<

(1) Yohei investigated how much he grew every year, and he is representing the amount of growth in his height in a bar graph.

How many cm did he grow from Grade 5 to Grade 6? Write your answer.

Also, on the answer sheet, draw a bar ( ) and complete the bar graph. Shade your bar like all other bars are.

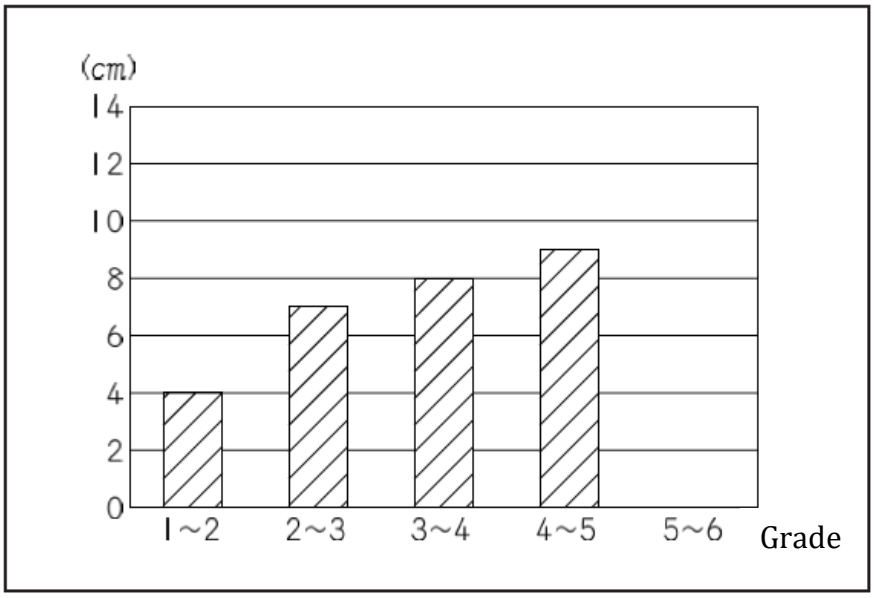
Yohei's heights across the years

学年（年）	1	2	3	4	5	6
身長（cm）	110	114	121	129	138	144
Growth (cm)		4	7	8	9	

>>> The table is the same as the one on the previous page with additional information below the table. "Growth (cm)"

Yohei's growth b Yohei's heights across the years y year

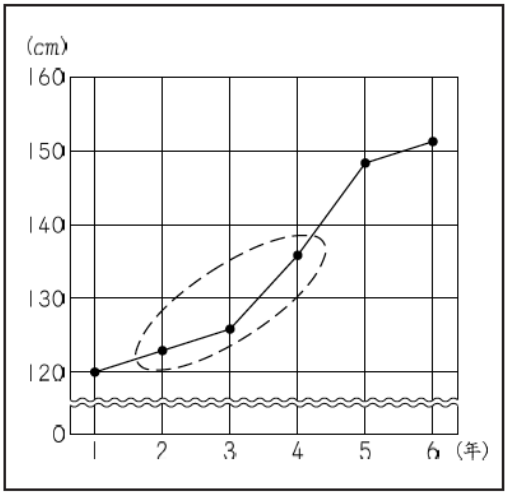
Yohei's growth by year



"1 ~ 2" in the bar graph represents "from Grade 1 to Grade 2."

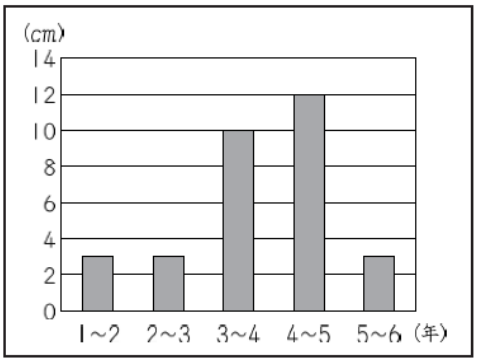
The broken line graph on the right shows the height of one of Yohei's classmate, Kyoko, Kouji, Naomi, or Kenta.

[ ]'s heights across the years

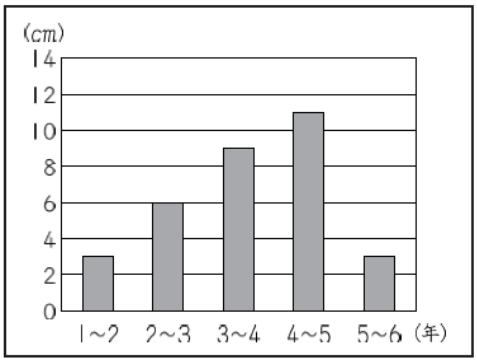


The bar graphs below represent how much each of the 4 students grew from one grade to the next.

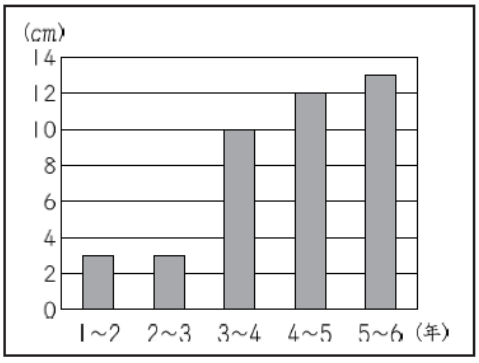
1 Kyoko's growth by year



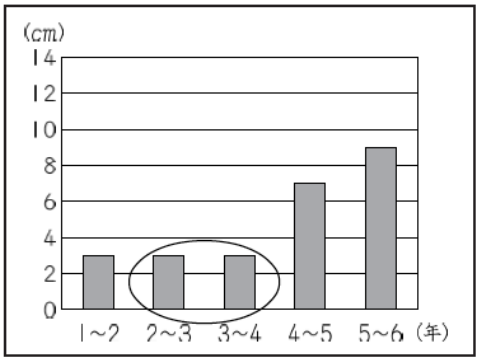
2 Kouji's growth by year



3 Naomi's growth by year



4 Kenta's growth by year



We are going to figure out whose heights the broken bar graph above represents.

(2) Yohei looked at the part of the broken line graph marked by ⬭ and the part of bar graph **4** marked by ⬭ and said the following.

Yohei

If you look at the part of the broken line graph marked by ⬭ and the part of bar graph **4** marked by ⬭, we can tell that the broken line graph is not for Kenta's heights.

The reason Yohei knew that "the broken line graph is not for Kenta's heights" is because he noticed what difference about the changes in the part of the broken line graph marked by ⬭ and the growth shown by the part of bar graph **4** marked by ⬭? By examining the graphs, write the difference using words and numbers.

(3) In Problem (2), we decided that the broken line graph was not for Kenta's heights.
Whose heights, Kyoko's, Kouji's or Naomi's, does the broken line graph represent? Select the bar graph showing the person's growth from bar graph **1** through **3** above and write the number