

2007_Grade_6_Mathematics_Set_B

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2007 Problem Set B


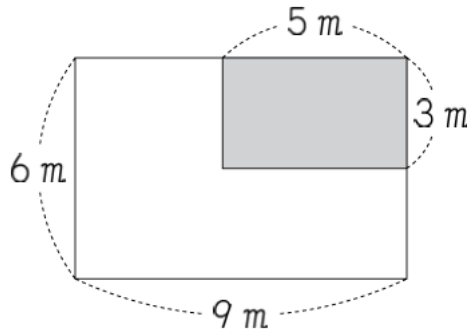


- [1] As shown in Figure A, there is a rectangular flower bed whose vertical sides are 6 m long and the horizontal sides are 9 m long. Inside the flower bed, there is a rectangular  region whose vertical sides are 3 m long and the horizontal sides are 5 m long.

Figure A



- (1) We are going to place a rope around the  region. What calculations can we use to find the length of rope that will be placed around the  region? Select 2 expressions from **1** through **5** below and write the numbers.

1 $5 + 3$

2 5×3

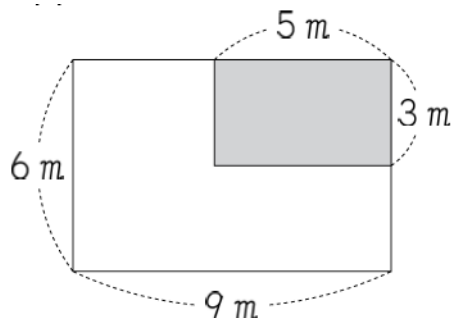
3 $5 + 3 + 5 + 3$


4 $5 \times 3 \times 2$

5 $(5 + 3) \times 2$

- (2) Misaki is going to plant tulips in the white  region.

Figure A




Which calculation can we use to find the area of the  region?
 Select one from **1** through **4** below and write the number.


1 $5 \times 3 + 3 \times 9$

2 $3 \times 6 - 5 \times 3$

3 $6 \times 9 - 3 \times 5$

4 $3 \times 9 - 3 \times 5$

- (3) Figures B, C, D and E are all flower beds whose vertical sides are 6 m long and the horizontal sides are 9 m long. Inside each flower bed, there is a rectangular region  whose vertical sides are 3 m long and the horizontal sides are 5 m long.

The area of white regions in each of Figures B, C, D and E are the same as the area of the white region  in Figure A. Why are their areas equal?

Write the reason using words, expressions and diagrams.

Figure B

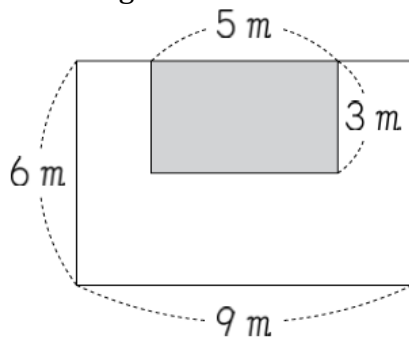


Figure C

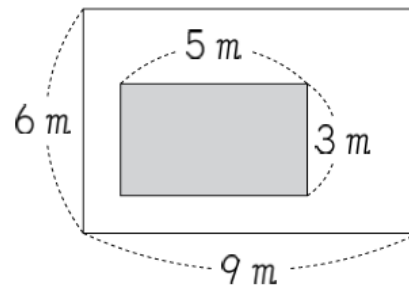


Figure D

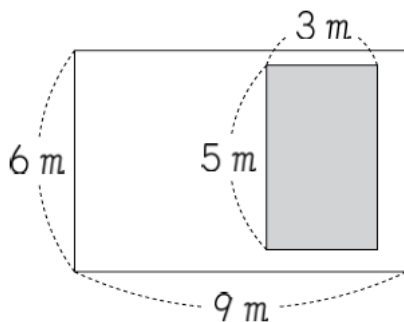
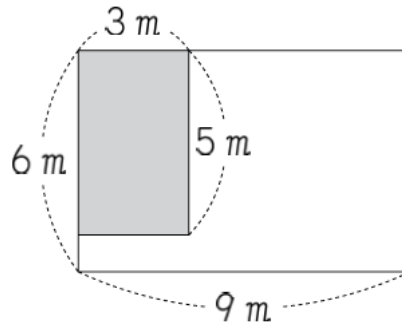
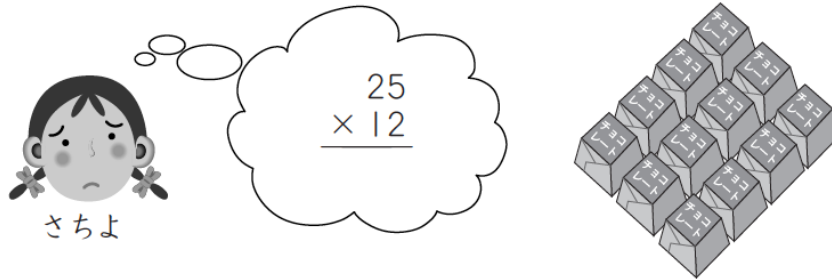


Figure E




- [2] A piece of chocolate costs 25-yen, and we are going to buy 12 pieces. We will calculate the total cost. Sachiyo decided to calculate using the algorithm.



>>> The name of the girl, Sachiyo, underneath. On top of each piece of chocolate, "chocolate" is written, but I don't think we need to translate this <<<<

After Takashi and Etsuko heard Sachiyo's idea, they each came up with strategies to calculate 25×12 without using the algorithm.


たかし



Boy's name: Takashi

12 is the same as 4×3 .
 So, first calculate 25×4 and get 100.
 Then, we can find the 3 times as much as 100 by calculating 100×3 .
 The answer is 300.

えつ子



Girl's name: Etsuko

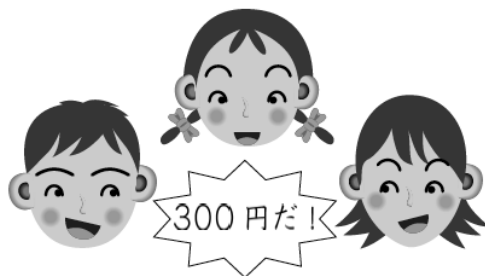
$$25 \times 12$$

$$= 25 \times (4 \times 3)$$

$$= (25 \times 4) \times 3$$

$$= 100 \times 3$$

$$= 300$$



>>>>Inside the bubble in the middle of the three children: It's 300!<<<<<

Next, Sachiyo is trying to determine the total cost for 32 pieces.



I want to buy 32 pieces of chocolate.

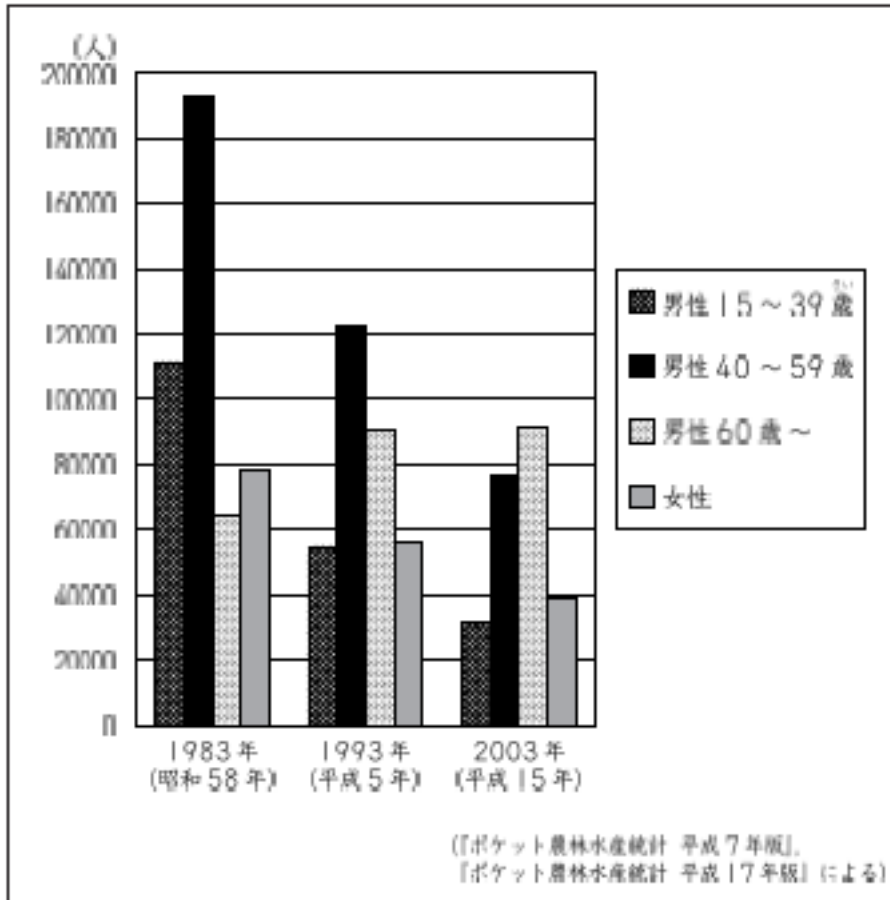
>>>name of the girl, Sachiyo<<<

Let's calculate 25×32 by thinking about ways to calculate like Takashi and Etsuko did.

Write your strategy using words and expressions.

- [3] Akiko is looking at the bar graph below while studying Japanese fisheries. This bar graph represents the number of men working in fisheries by age groups and the number of women in fisheries every 10 years starting with 1983.

Number of people working in fisheries



{inside the graph}

Very top (above 200000): People

Inside the box (keys):

top row: Men, 15 ~ 39 years old

2nd row: Men, 40 - 59 years old

3rd row: Men 60 year old ~

4th row: Women

{Along the horizontal axis, below 1983, 1993, and 2003. Japanese representation of years, omit }

At the bottom inside (): From "1995 Agriculture Forestry and Fisheries Statistics" and "2005 Agriculture, Forestry and Fisheries Statistics"

- (1) In 1983, which group had the largest number of people working in fisheries? In 2003, which group had the largest number of people working in fisheries?

For each year, select one from **1** through **4** below and write the number.

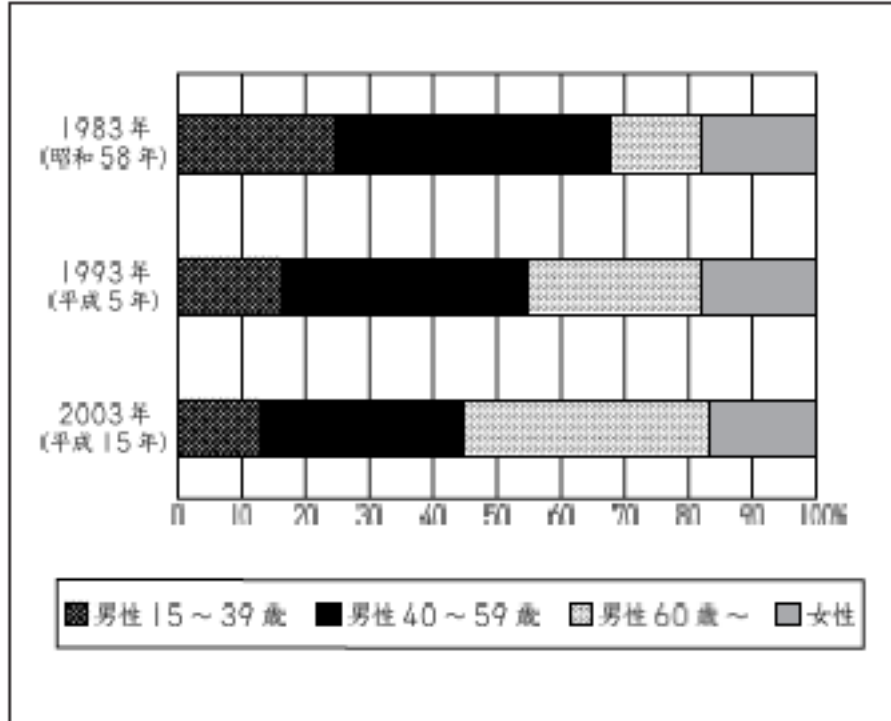
- 1** Men 15 ~ 39 years old
- 2** Men 40 ~ 59 years old
- 3** Men 60 years old ~
- 4** Women

- (2) From the bar graph, we can tell that the total number of people working in fisheries has changed.

From 1983 to 2003, write how **the total number** of people has changed.

- (3) Next, Akiko represented the proportions of people working in fisheries by groups every 10 years starting with 1983 using percentage bar graphs.

Proportions of people working in fisheries by groups



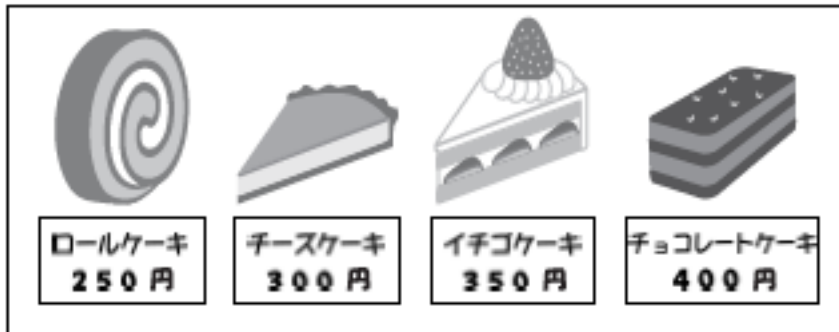
{inside the graph: Japanese representation of years, omit. 4 groups, Men 15 ~ 39 years old, Men 40 ~ 59 years old, Men 60 years old ~, Women}

From the percentage bar graphs, what can you say about changes from 1983 to 2003?

From 1 through 5 below, select 2 correct statements and write the numbers.

- 1 The number of people working in fisheries has declined.
- 2 The proportion of "Men 15 ~ 39 years old" working in fisheries has declined.
- 3 The proportion of "Women" working in fisheries has about halved.
- 4 The proportion of "Men 60 years old ~" has more than doubled.
- 5 The number of "Men 60 years old ~" has more than doubled.

- [4] There is a cake shop in Manabu's town.
The regular prices of a roll cake, cheese cake, strawberry cake, and chocolate cake are as shown.



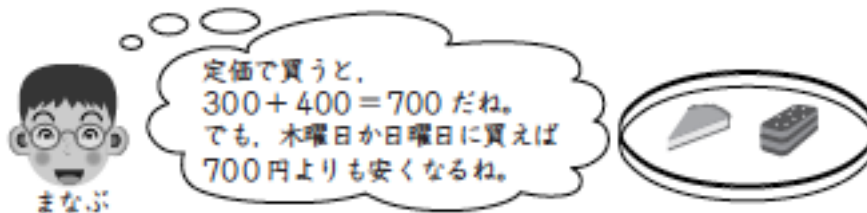
>>> Insert the figure: from left to right, roll cake (250-yen), cheese cake (300-yen), strawberry cake (350-yen), and chocolate cake (400-yen) <<<

Thursdays and Sundays are bargain days at the cake shop. On Thursdays and Sundays, their sale prices are as shown below.

Thursday
All cakes are 20 % off of the regular price.
For example, a cake whose regular price is 250-yen will be discounted by 50-yen, and the sale price is 200-yen.

Sunday
All cakes whose regular prices are 320-yen or lower will be sold at 200-yen.

- (1) Manabu plans to buy one cheese cake and one chocolate cake.

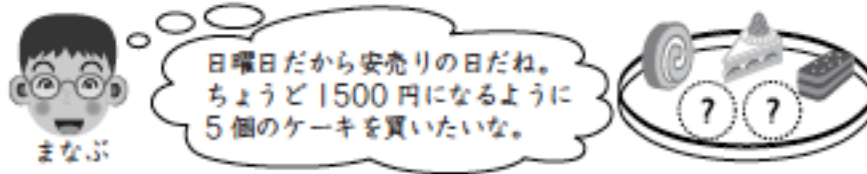


>>> Insert the figure: under the boy's picture - "Manabu" <<< {inside the bubble} If we buy them at their regular price, it will be $300 + 400 = 700$. But, if I buy them on Thursday or Sunday, it will be cheaper than 700-yen, isn't it?

On which day, Thursday or Sunday, will the total cost be lower and by how much? Write the mathematical expressions and the answer.

- (2) On **Sunday**, Manabu went to get 5 cakes. He wants to make the total cost of the 5 cakes to be exactly 1500-yen.

Manabu first picked one each of roll cake, strawberry cake and chocolate cake.

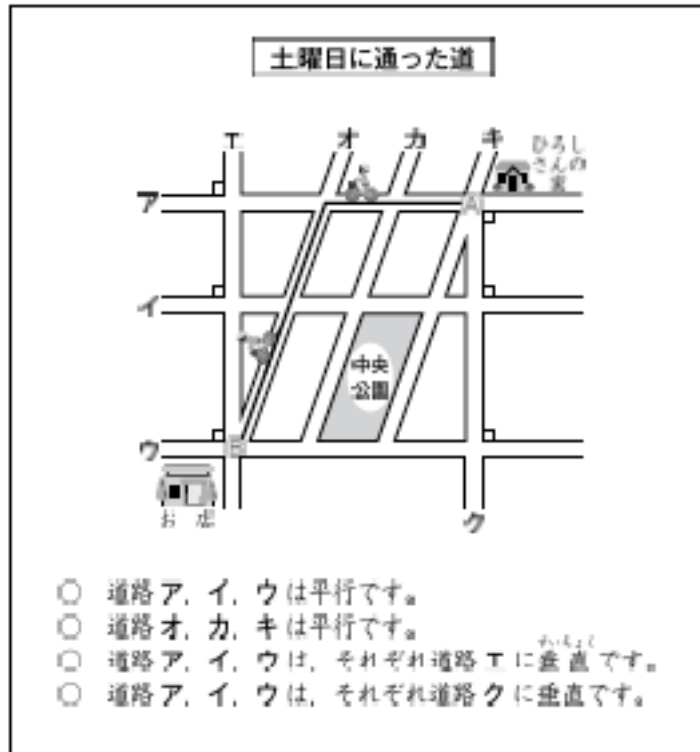


>>> Insert the figure: under the boy's picture - "Manabu" <<< {inside the bubble} Since it's Sunday, it is a bargain day. I want to buy 5 cakes so that the total cost is exactly 1500-yen.

For the last 2 cakes, which of roll cake, cheese cake, strawberry cake and chocolate cake and how many does he need to pick?

Write one possible way.

- [5] Hiroshi went shopping on Saturday. From Intersection (A) to Intersection (B), he used the route shown with  on the map below.



>>>Japanese Texts in the diagram<<<

Title of the map: Route Used on Saturday

horizontal streets labeled: A, B, C

vertical streets labeled at the top: D, E, F, G

vertical street on the bottom: H

at the top right "Hiroshi's House"

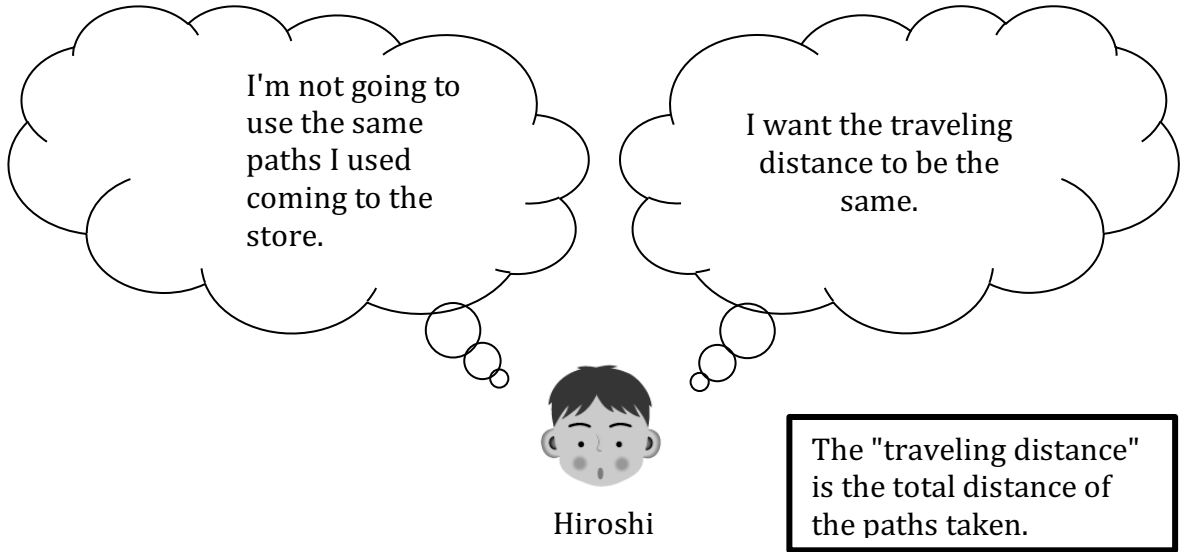
at the bottom left "Store"

inside the map: "Central Park"

Bullets:

- Streets A, B and C are parallel to each other.
- Streets E, F and G are parallel to each other.
- Streets A, B and C are perpendicular to Street D.
- Streets A, B, and C are perpendicular to Street H.

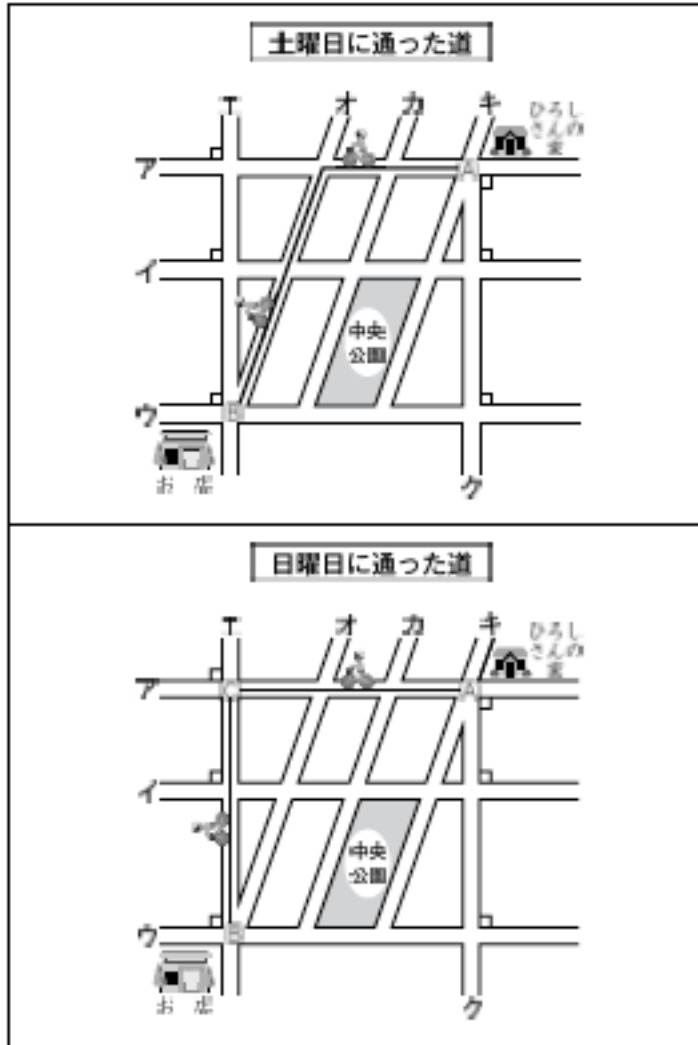
- (1) Hiroshi is done with shopping, and he plans to go back from Intersection B to Intersection A.
Hiroshi is thinking as follows.



What route should Hiroshi use so that he will not use any path that he used coming to the store and the traveling distance for the return trip is equal to the traveling distance to the store?

In the map on the answer sheet, draw one route using line (————).

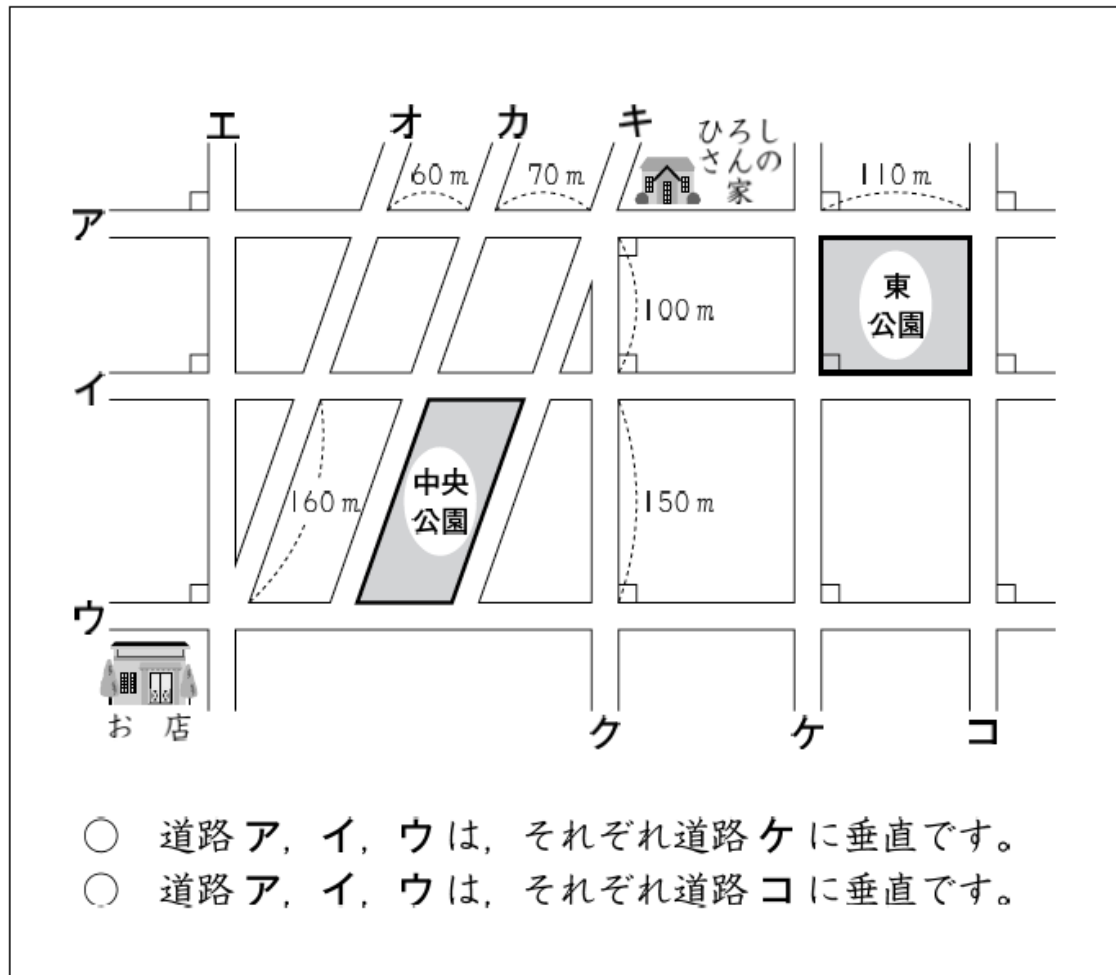
- (2) The next day, Sunday, Hiroshi went from Intersection A to Intersection B by going through Intersection C.
Which route, one taken on Saturday or one taken on Sunday, has a longer traveling distance?
Write your answer.



The route taken on Saturday

The route taken on Sunday

- (3) Near Hiroshi's house is East Park. Which park, East Park or Central Park, has the larger area?
Write your answer. Also, write the reason for your answer using word, expressions, etc.



>>> the map has "East Park" near Hiroshi's house.

Vertical streets on the bottom (to the right of H): I and J

Bullets

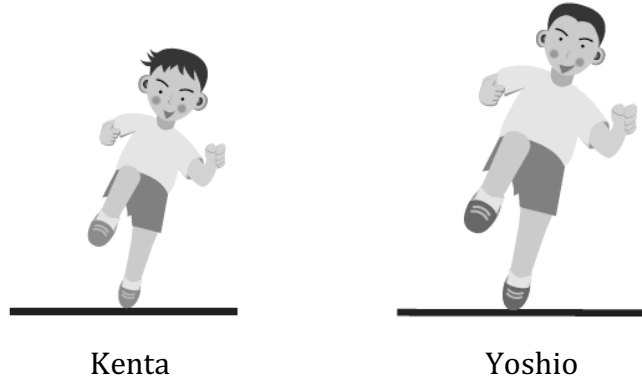
- Streets A, B and C are perpendicular to Street I.
- Streets A, B and C are perpendicular to Street J.

- [6] In the PE class, students are learning about high jump. It is said that the height of someone's high jump is related to his or her 50 m dash time. The following calculation can determine the approximately how many cm someone can high jump.

Calculation to determine the approximate height (cm) of high jump

To half the of height (cm) add 120, then subtract 10 times their 50 m dash (sec.)

$$(\text{height} \div 2) + 120 - (50 \text{ m dash time} \times 10)$$



Kenta's and Yoshio's heights and 50 m dash times are as follows.

| | Height (cm) | 50 m dash time (Sec.) |
|--------|-------------|-----------------------|
| Kenta | 140 | 8.0 |
| Yoshio | 160 | 8.0 |

- (1) Kenta calculated the approximate height of his high jump using the expression. When Kenta actually tried, his record was 115 cm. What can we say about this record if we compare it to the calculated approximate height?

Select the correct one from **1** through **3** below and write the number.

- 1** Kenta's record is exactly the same as the calculated approximate height.
- 2** Kenta's record is higher than the calculated approximate height.
- 3** Kenta's record is lower than the calculated approximate height.

- (2) Yoshio is also trying to calculate his approximate height using the expression.

After looking at Kenta's and Yoshio's heights and 50 m dash times, Kenta said the following.



Kenta

We can tell without calculation that the approximate height of Yoshio's high jump will be higher than the approximate height for me.

Why did Kenta say "we can tell without calculation"?
Write the reason using words and expressions.