Grade 6 Set A

This is an unofficial translation of the assessment tasks for grade 6, published by the Ministry of Education, Culture, Sports, Science, and Technology-Japan in 2007. The original assessment tasks are in Japanese and are available on the Web site at http://www.nier.go.jp/tyousa/mondai.htm. English translation by Asia-Pacific Mathematics and Science Education Collaborative (AP・MSEC), DePaul University School of Education, http://education.depaul.edu/AboutUs/CentersInitiatives/APMSEC.

1 Calculate the following.

(1) $28 + 72$

(2) 27×72

(3) 9.3×0.8

(4) $12 \div 0.6$

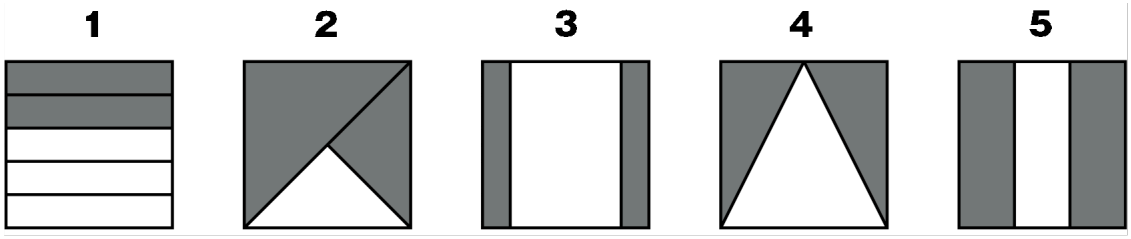
(5) $1 - \frac{5}{8}$

(6) $\frac{3}{7} + \frac{4}{7}$

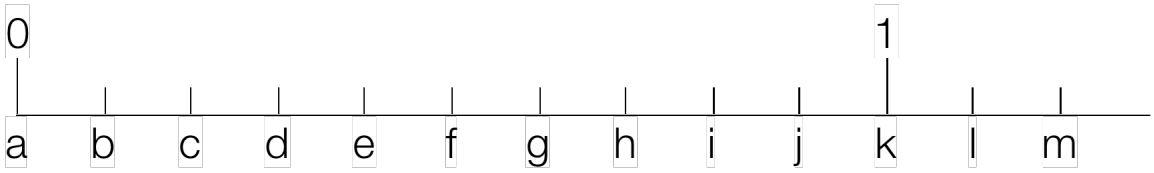
(7) $6 + 0.5 \times 2$

2

Which of the figures **1 ~ 5** is $\frac{2}{3}$ shaded? Answer with **1 ~ 5**.



3 On the number line below, the space between consecutive whole numbers has been equally partitioned into 10 segments. Answer the following questions.



(1) Where is $\frac{7}{10}$ on the number line? Answer with (a) ~ (m).

(2) We want to indicate the largest of three numbers, 0.5, $\frac{7}{10}$, and $\frac{4}{5}$ on the number line. Which of the tick marks (a) ~ (m) is for the largest of these three numbers?

4

From the problems below, select one that may be solved by using 210×0.6. Answer with **1 ~ 4**.

1 We bought 0.6 kg of sugar and paid 210 yen. How much would 1 kg of sugar cost?

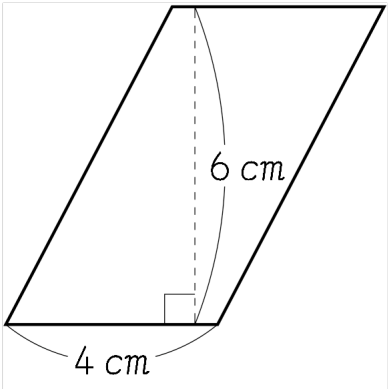
2 There are 210 kg of soy beans. If we are to put them in bags of 0.6 kg each, how many bags do we need altogether?

3 1 meter of ribbon costs 210 yen. If we buy 0.6 m of the ribbon, how much do we need to pay?

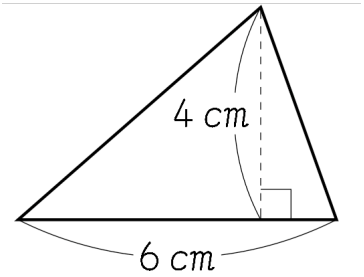
4 A red tape is 210 cm long. If the red tape is 0.6 times as long as a white tape, what is the length of the white tape in centimeters?

5 Write the math sentence and calculate the area of each of the following figures.

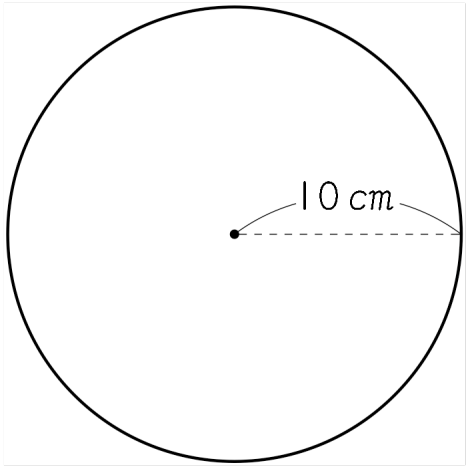
(1) Parallelogram



(2) Triangle

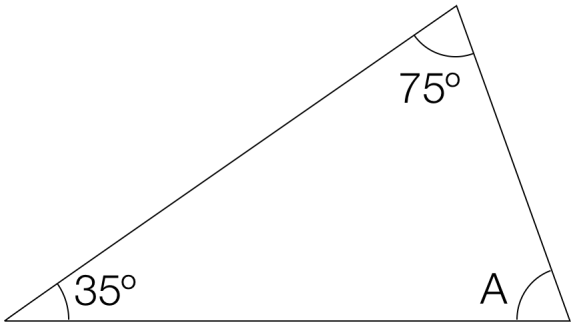


(3) Circle (use 3.14 as the approximate value of pi)

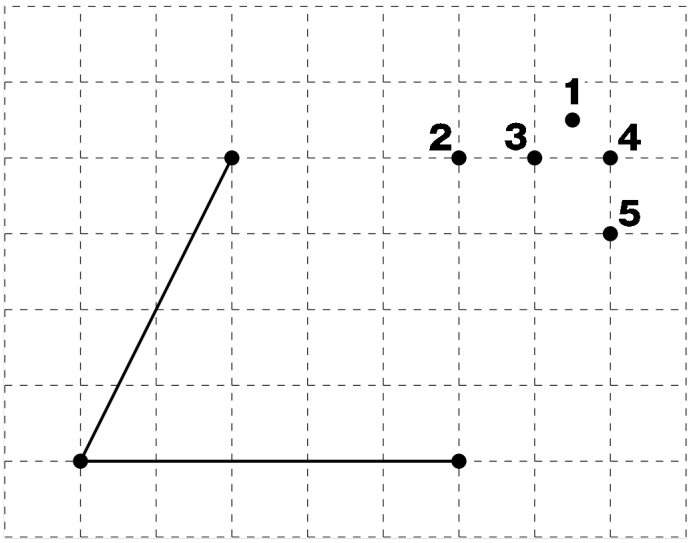


6 Answer the following questions.

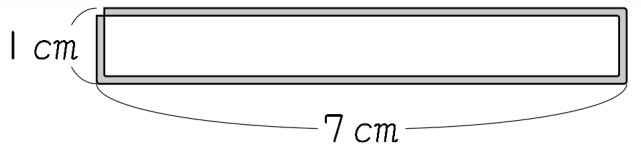
(1) What is the measure of the angle labeled A in the triangle below?

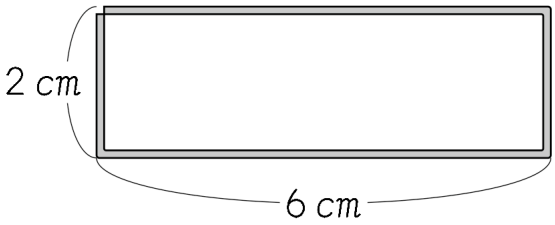


(2) In order to draw a parallelogram on the grid below, where should the other vertex be? Choose one point from **1 ~ 5**.



7 We are making rectangles and squares using a 16 cm rope. The figures below are examples.





. . .

(1) What will be the horizontal dimension of the rectangle when the vertical dimension is 3 cm?

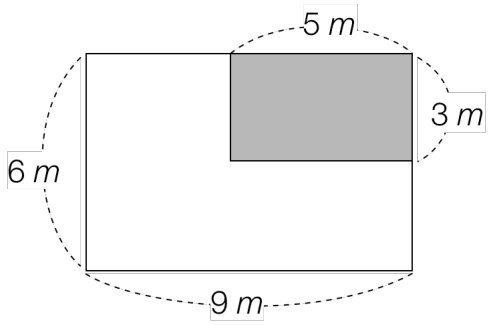
(2) The vertical and horizontal dimensions of the rectangles and squares can be summarized in a table. Fill in the blanks in the table shown on the answer sheet.

vertical (*cm*)	1	2	3	4	5	6	7
horizontal (*cm*)	7						

(3) What happens to the horizontal dimension when the vertical dimension increases by 1 cm? Write the appropriate number in the blank, and circle either "increases" or "decreases" on the answer sheet.

Grade 6 Set B

1 There is a rectangular flowerbed whose length is 9 *m* and width is 6 *m*. Inside the flowerbed, there is a rectangular region, shown as ▭ in the figure below, whose length is 5 *m* and width is 3 *m*.



(1) We are going to put a fence around the ▭ . Which of the following shows the calculation needed to determine the length around the ▭? Answer with **1 ~ 5**. Select two answers.

1 $5 + 3$

2 5×3

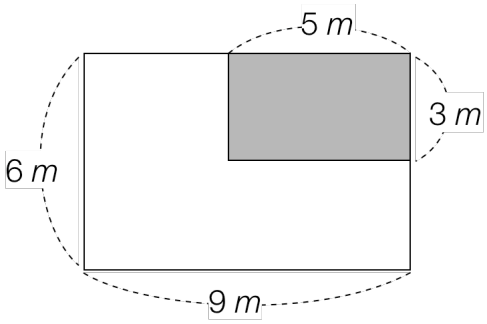
3 $5 + 3 + 5 + 3$

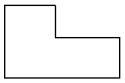
4 $5 \times 3 \times 2$

5 $(5 + 3) \times 2$

(2) Miyuki is going to plant tulips in the white region  of the flowerbed.

Figure A



With which expression below can you use to find the area of the  ? Choose one from **1** ~ **4**. Then 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 ~ F below all show rectangular flowerbeds whose lengths are 9 m and widths are 6 m. Inside each flowerbed, there is a rectangular region, shown as  , whose length is 5 m and width is 3 m.

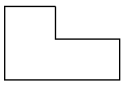
The areas of these flowerbeds are exactly the same as the  in Figure A. Explain why these areas are equal by using words, figures, and mathematical expressions or equations.

Figure B

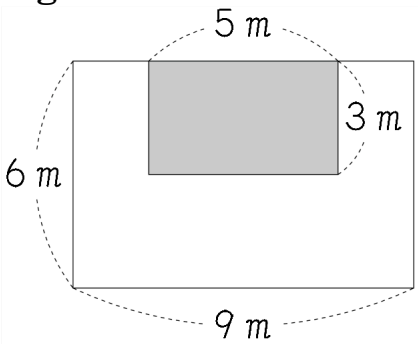


Figure C

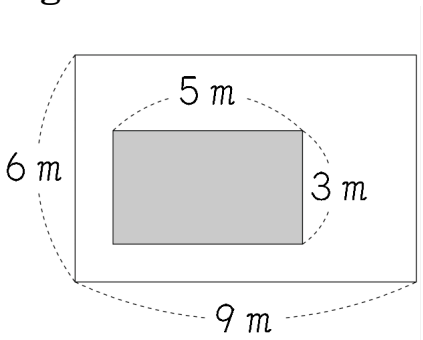


Figure D

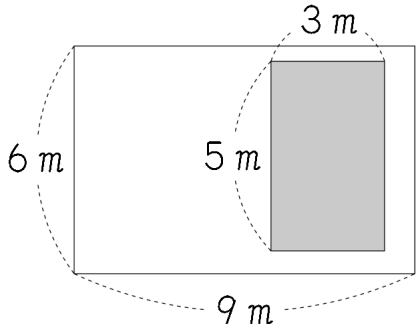
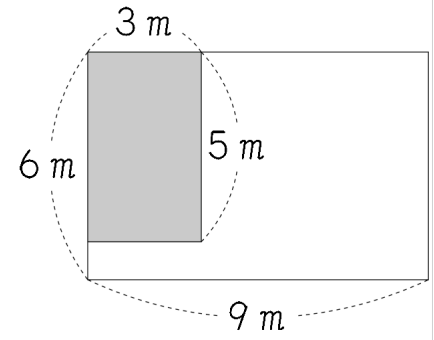
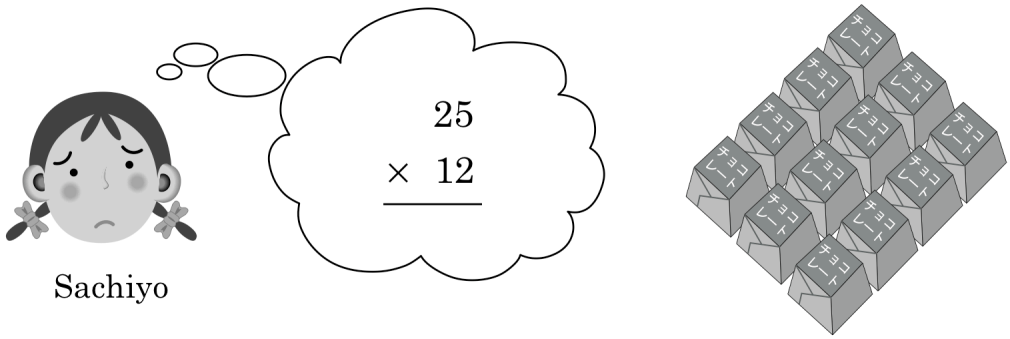


Figure E

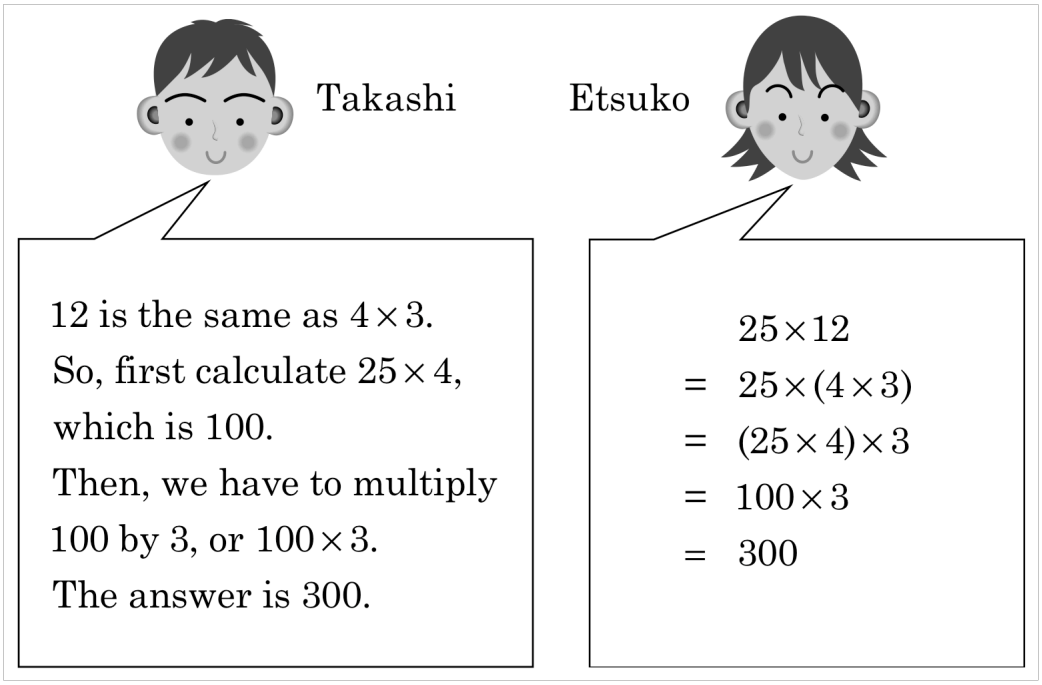


2

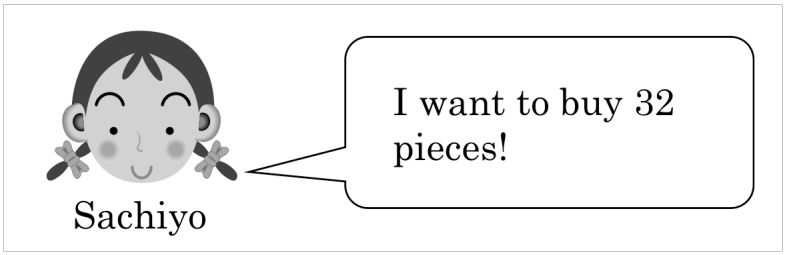
We are buying 12 pieces of chocolate, and each piece costs 25 yen. We must calculate the total cost. Sachiyo was going to use the multiplication algorithm.



However, Takashi and Etsuko thought about simple ways to calculate without using the algorithm.

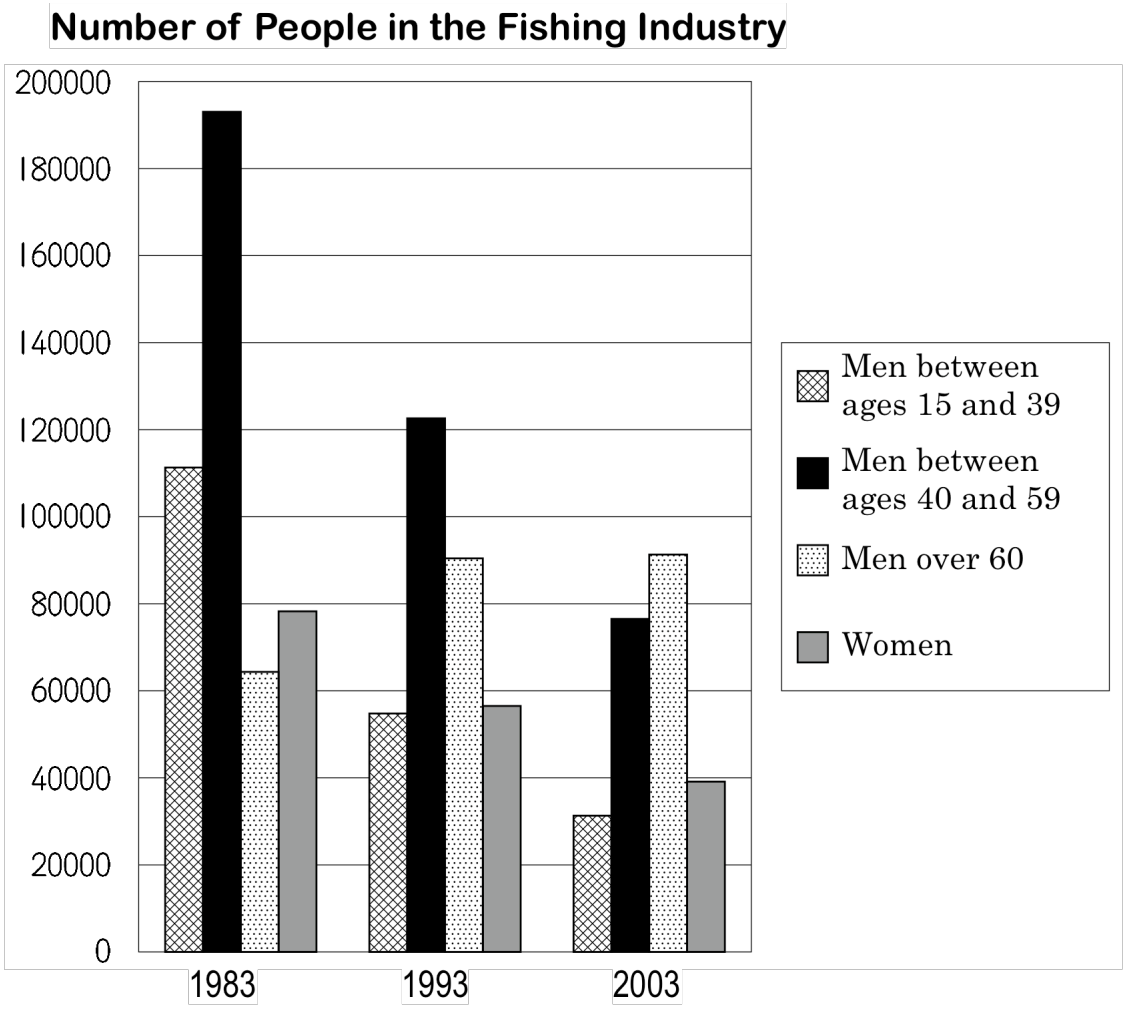


Sachiyo wants to figure out the total cost if she buys 32 pieces of chocolates.



Let's think about ways to calculate the total cost without using the algorithm, just like Takashi and Etsuko did. Write how you might calculate it using words and math sentences.

3 Akiko is looking at the bar graph below as a part of her study of the fishing industry in Japan. The graph shows the number of men, in 3 age groups, and women who were involved in the fishing industry every 10 years since 1983.



From *Pocket Statistics of Agriculture, Forestry, and Fishing*, 1995 and 2005.

(1) Which group had the largest number of people involved in the fishing industry in 1983? Which group had the largest number of people in 2003? Select an answer from **1 ~ 4** for each question.

1 Men between ages of 15 and 39

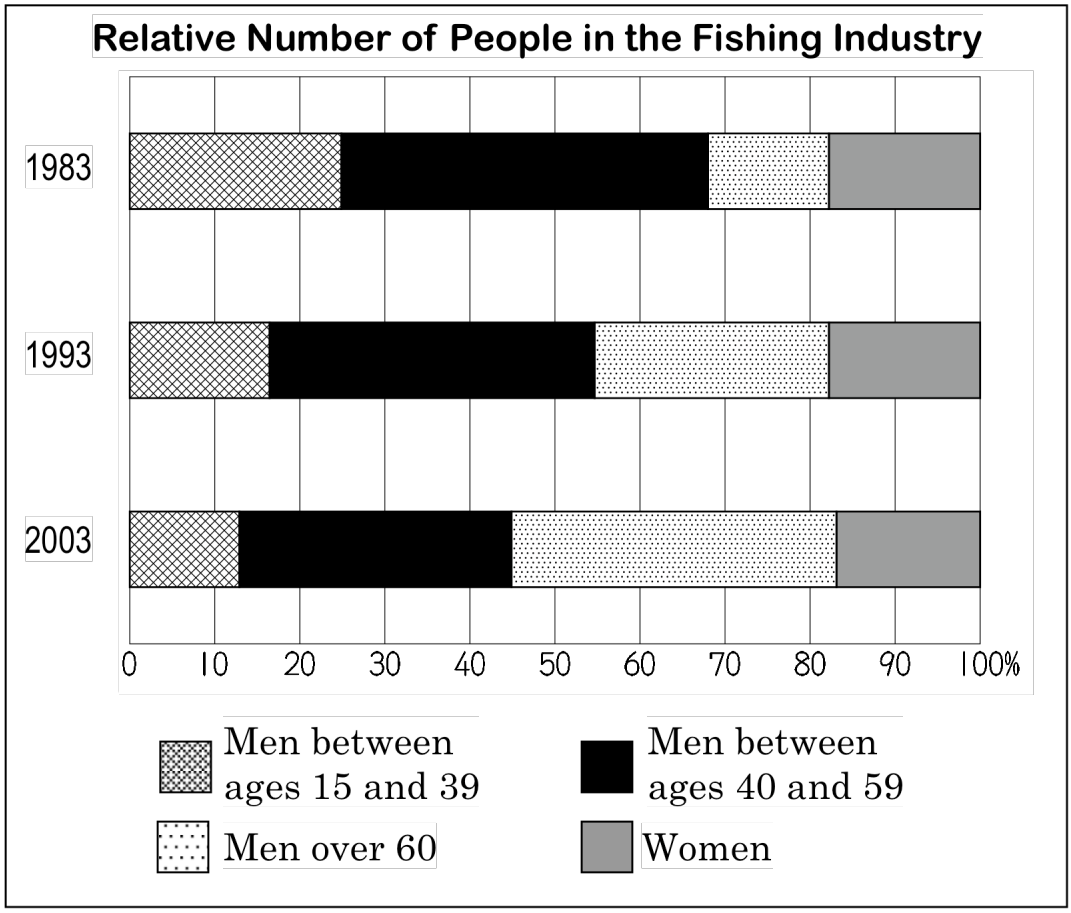
2 Men between ages of 40 and 59

3 Men over age of 60

4 Women

(2) From the bar graph, we can tell how the total number of people involved in the fishing industry has changed since 1983. Describe how the total number of people in the fishing industry changed between 1983 and 2003.

(3) Akiko then drew a percentage bar graph showing the relative numbers of people in the four groups in the same three years.



From the percentage bar graph, what changes in the fishing industry can we tell? Select two answers from **1 ~ 5** below.

1 The number of people involved in the fishing industry has decreased from 1983 to 2003.

2 The relative number of men between ages of 15 and 39 has decreased from 1983 to 2003.

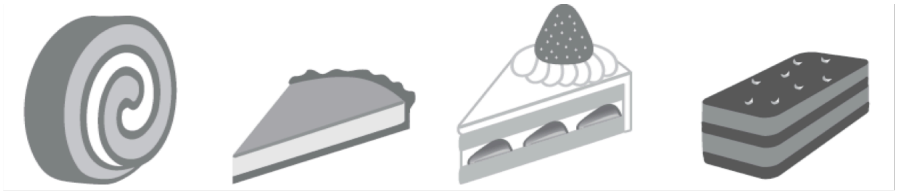
3 The relative number of women almost halved from 1983 to 2003.

4 The relative number of men over the age of 60 has more than doubled from 1983 to 2003.

5 The number of men over the age of 60 has more than doubled from 1983 to 2003.

4

There is a confectionery store in Manabu's town. The picture below shows the regular prices for rolled cake, cheese cake, strawberry cake, and chocolate cake.



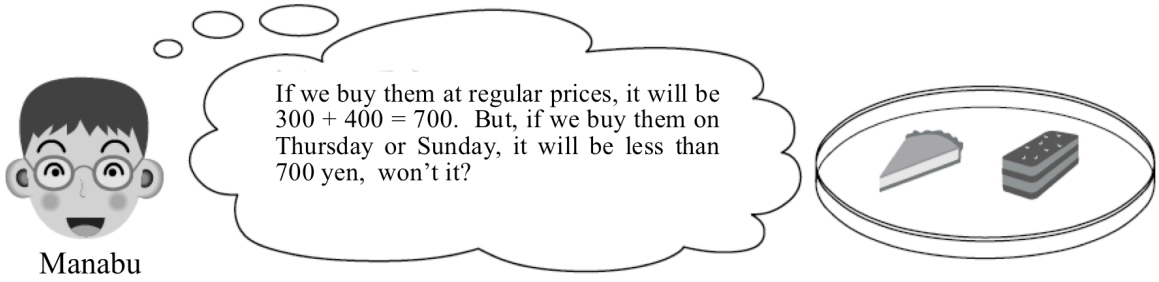
Rolled cake	Cheese cake	Strawberry cake	Chocolate cake
250 yen	300 yen	350 yen	400 yen

On Thursday and Sunday, this store has special sales, and their sale prices are shown below.

Thursday: All cakes are sold 20% off the regular prices. For example, a cake that sells for 250 yen usually will be reduced by 50 yen for the sale price of 200 yen.

Sunday: All cakes that are regularly priced at 320 yen or less will be sold for 200 yen.

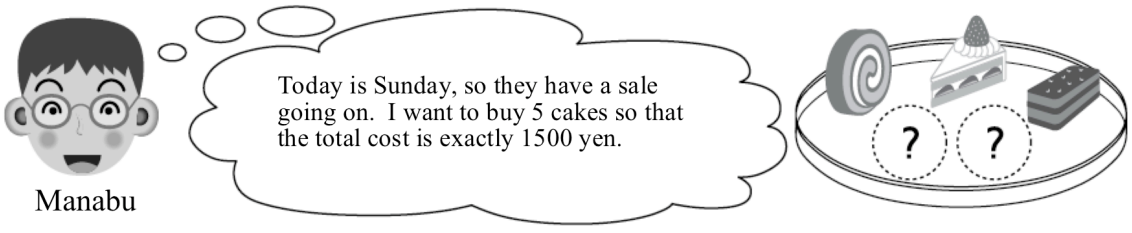
(1) Manabu wants to buy one cheese cake and one chocolate cake.



On which day will the total price be lower, Thursday or Sunday, and by how much? Write both the answer and the mathematical expressions used to calculate the answer.

(2) On Sunday, Manabu went to the store to buy 5 cakes. He wants the total cost of the five cakes to be 1500 yen.

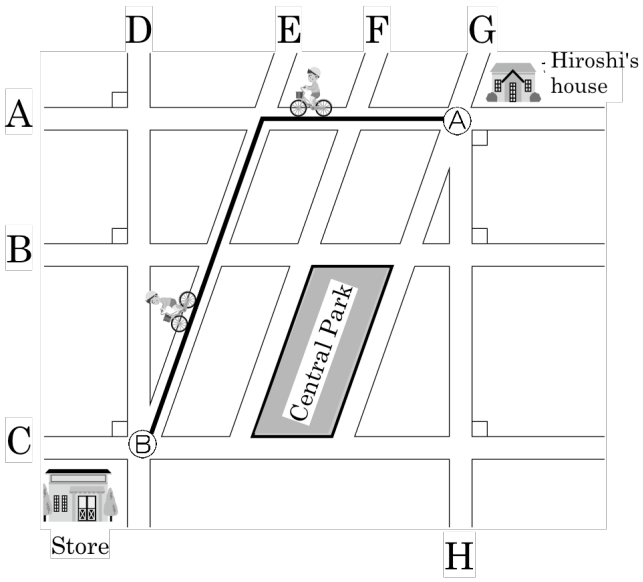
Manabu first picked one each of rolled cake, strawberry cake, and chocolate cake.



For the other two cakes, how many of which cakes might he pick? Give one possible answer.

5 On Saturday, Hiroshi went on a shopping trip. From the intersection marked Ⓐ to the one marked Ⓑ, he followed the path marked by _____.

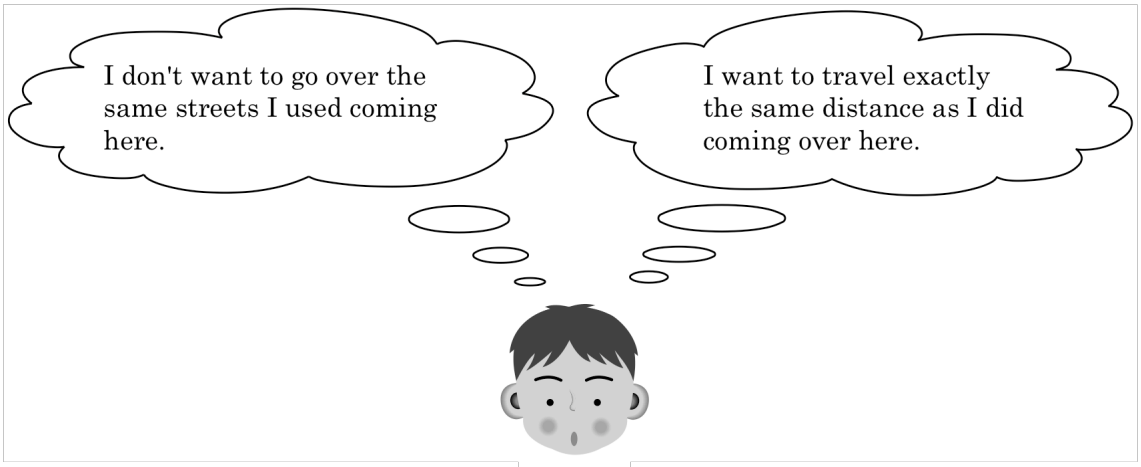
Path used on Saturday



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

(1) Hiroshi finished his shopping, and he is ready to go back home from intersection Ⓑ to intersection Ⓐ.

He is thinking as follows:

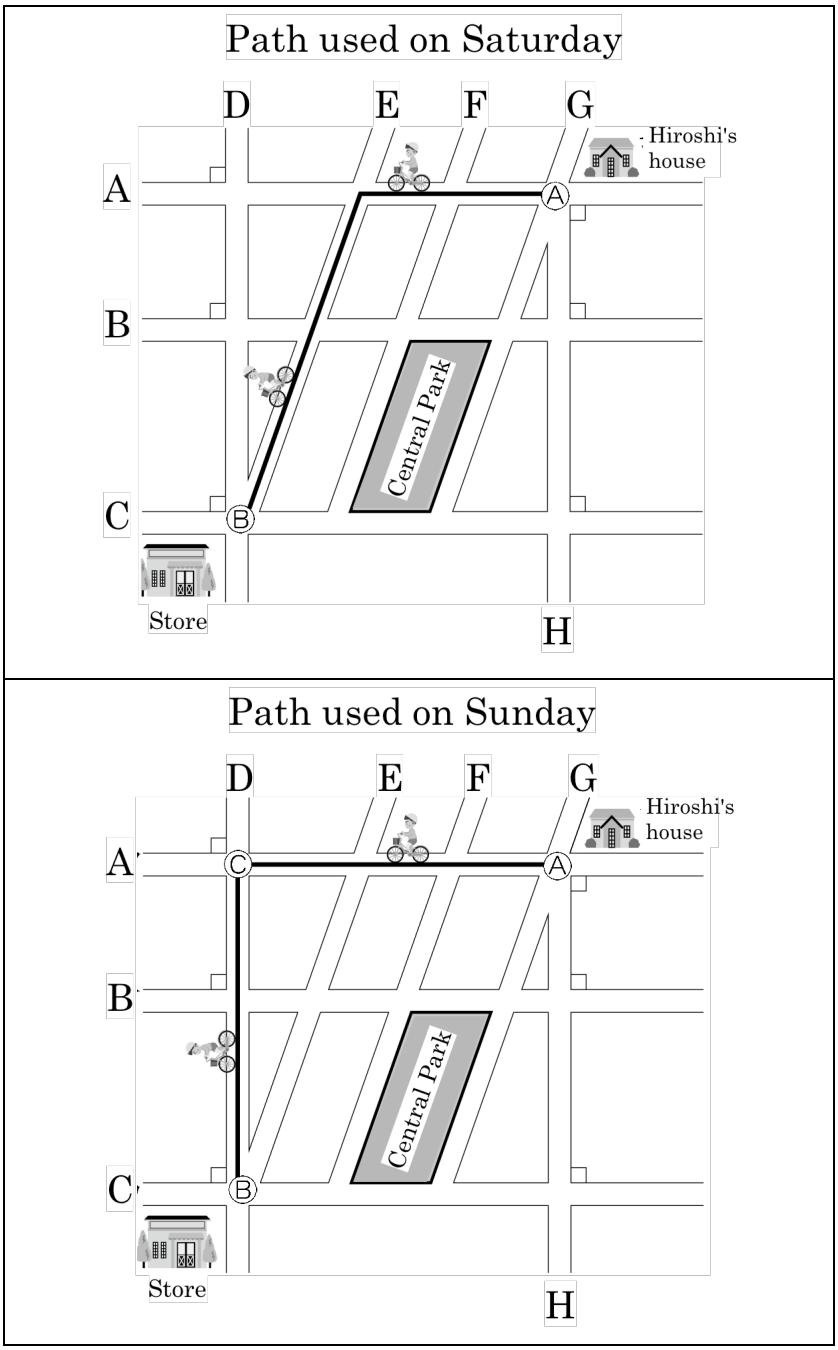


Hiroshi

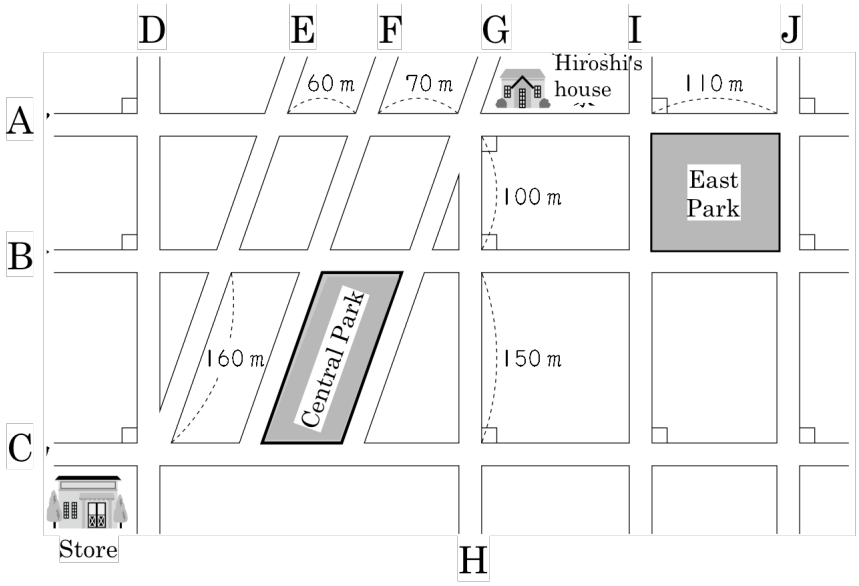
How can Hiroshi go home traveling the same distance but without using any of the streets he traveled before?

Mark one possible path on the map included in the answer sheet.

(2) The next day, Sunday, Hiroshi went from intersection Ⓐ to intersection Ⓑ, by way of intersection Ⓒ. Which path is longer, the one Hiroshi used on Saturday or the one he used on Sunday? Write your answer.



(3) There are two parks close to Hiroshi's house, as shown in the map below. Which park has the larger area, Central Park or East Park? Write your answer and the reason for your answer using words and mathematical equations and expressions.



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

6 In the gym class, we are doing the high jump.

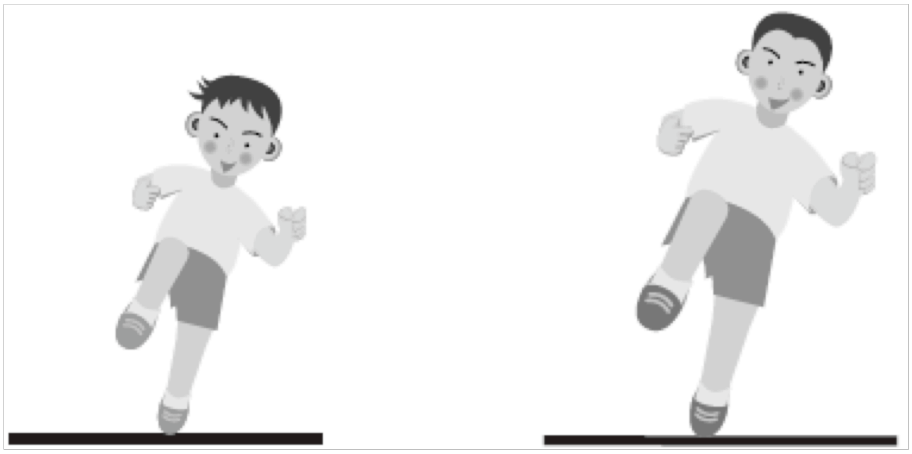
It is said that there is a relationship between a person's height, the time for a 50 meter dash, and how high she or he can jump.

The following formula can be used to estimate how high a person can jump.

Formula for estimating how high a person can jump in *cm*

Add 120 to a half of the height (in *cm*), then subtract ten times the amount of time needed for a 50 meter dash.

(height ÷ 2) + 12 – (time for 50 *m* dash x 10)



Kenta Yoshio

The heights and the times for 50 *m* dash for Kenta and Yoshio are shown in the table below.

	height (*cm*)	time (*sec*)
Kenta	140	8.0
Yoshio	160	8.0

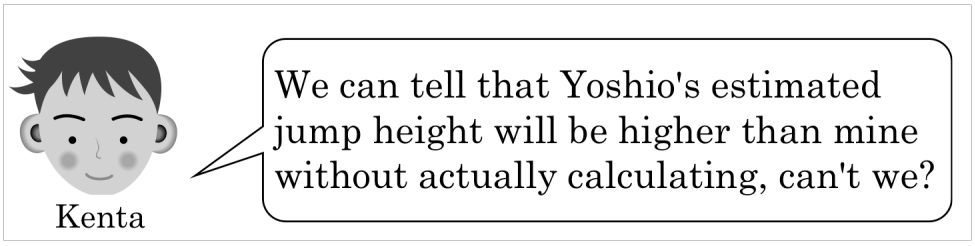
(1) Kenta estimated the height of his jump using the given formula. The actual height he could jump was 115 *cm*. What can you say when you compare the actual height with the estimate calculated by using the formula? Select your answer from **1** ~ **3** below.

1 The actual height was equal to the estimated height.

2 The actual height was greater than the estimated height.

3 The actual height was less than the estimated height.

(2) Yoshio is also trying to estimate the height of his jump using the formula. Kenta said the following as he looked at the heights and the times for 50 *m* dash for two of them.



Why did Kenta say we can tell "without actually calculating"? Explain his reasoning using words and mathematical expressions.