2011 Grade 6 Mathematics

This is an unofficial translation of 2011 Japanese Achievement Test. Original may be found at
https://www.nier.go.jp/11chousa/11mondai_shou_sansuu_a.pdf
and
https://www.nier.go.jp/11chousa/11mondai_shou_sansuu_b.pdf

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2011 Problem Set A

[1] Calculate the following

(1) $806 - 9$

(2) 13.9×7

(3) $12 \div 0.6$

(4) $8 \times 4 - 2 \times 5$

(5) $5 \times (2 + 3)$

(6) $1\frac{2}{7} - \frac{4}{7}$

(7) $\frac{1}{4} + \frac{2}{5}$

[2] Answer the following questions.

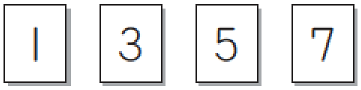
(1) Write the following number using numerals.

One hundred thousand four hundred eight

(2) In the following equation, write the appropriate number in ● .

$$7.35 = 7 + \frac{\bullet}{100}$$

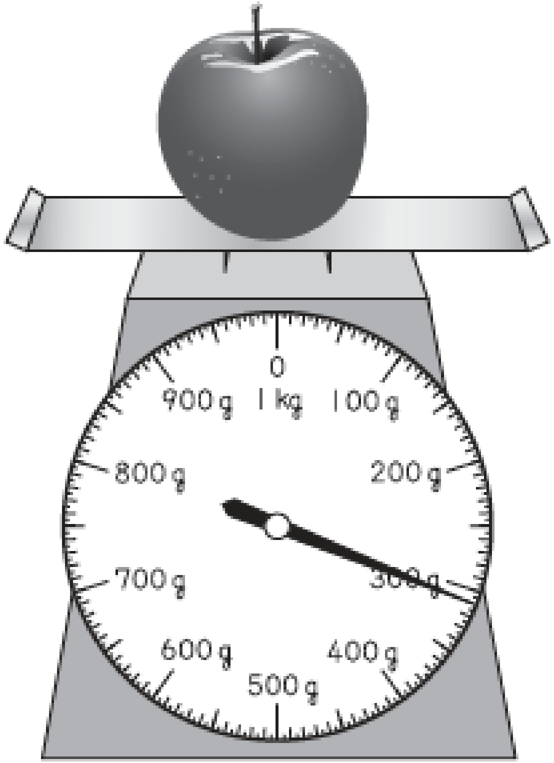
(3) There are following 4 cards.



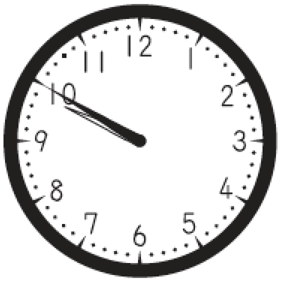
Using these cards exactly once, we will make a 4-digit whole number. Of the numbers we can make, write the whole number that is closest to 5000.

[3] Answer the following questions.

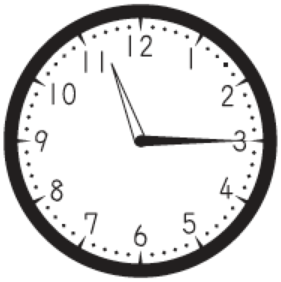
(1) When an apple is placed on a scale, the result was as shown in the figure below.
How many g is the weight of this apple? Write your answer.


0
1 kg
100 g
200 g
300 g
400 g
500 g
600 g
700 g
800 g
900 g

(2) Sachiko left her house at 9:50 am and arrived at the zoo at 11:15 am on the same day. How many hours and how many minutes did it take for her to reach the zoo from her house? Write your answer.

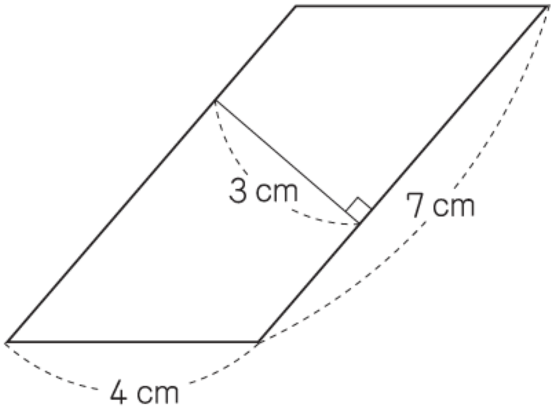

12
1
2
3
4
5
6
7
8
9
10
11

"Time she left her house"

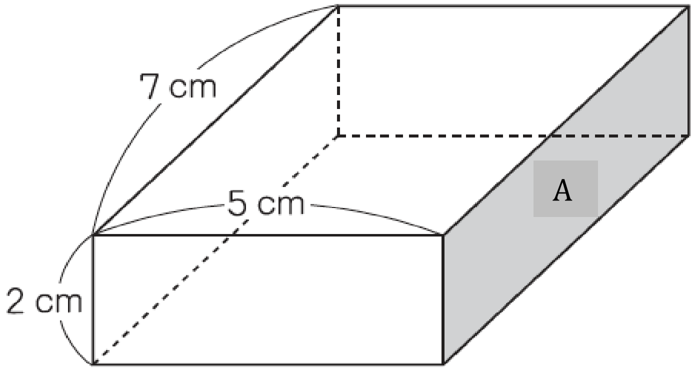

12
1
2
3
4
5
6
7
8
9
10
11

"Time she arrived at the zoo"

[4] Write the expression to calculate the area and the area of the following parallelogram.



[5] There is a rectangular prism like the one shown in the figure below.

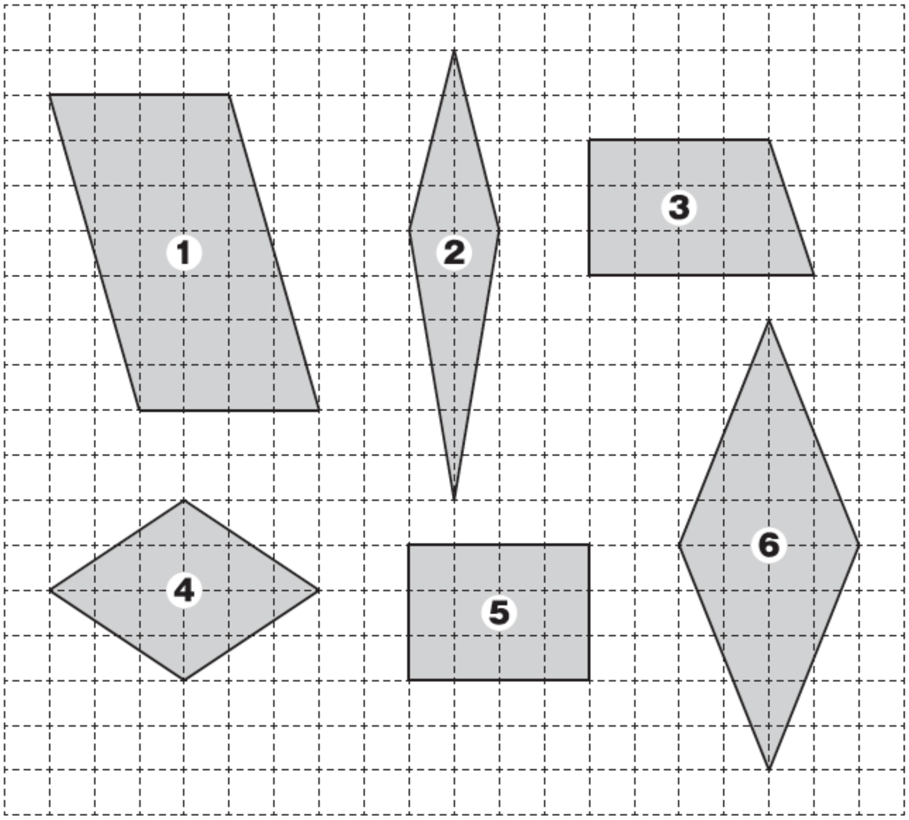


(1) What are the dimensions of the shaded rectangular face, A. Select from **1** through **3** below and write the number.

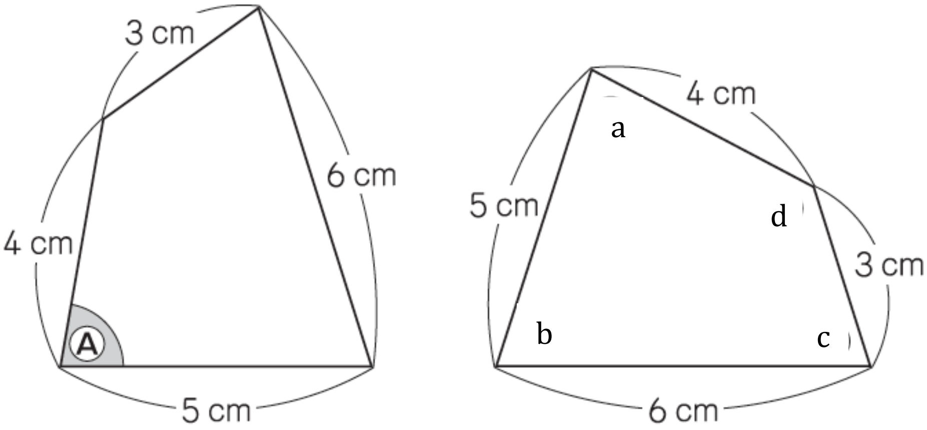
1 Rectangle with the vertical sides of 2cm and the horizontal sides of 5 cm.
2 Rectangle with the vertical sides of 2 cm and the horizontal sides of 7 cm.
3 Rectangle with the vertical sides of 7 cm and the horizontal sides of 5 cm.

(2) Write the expression to calculate the volume and the volume of this rectangular prism.

[6] Of the quadrilaterals drawn on the grid shown below, which ones are rhombuses? Select 2 from **1** through **6** and write the numbers.



[7] The 2 quadrilaterals below are congruent.
To which angle does angle **A** of the quadrilateral on the left correspond?
From angles **a** through **d** of the quadrilateral on the right select one and write the letter.


3 cm
6 cm
4 cm
A
5 cm
4 cm
a
5 cm
d
3 cm
b
c
6 cm

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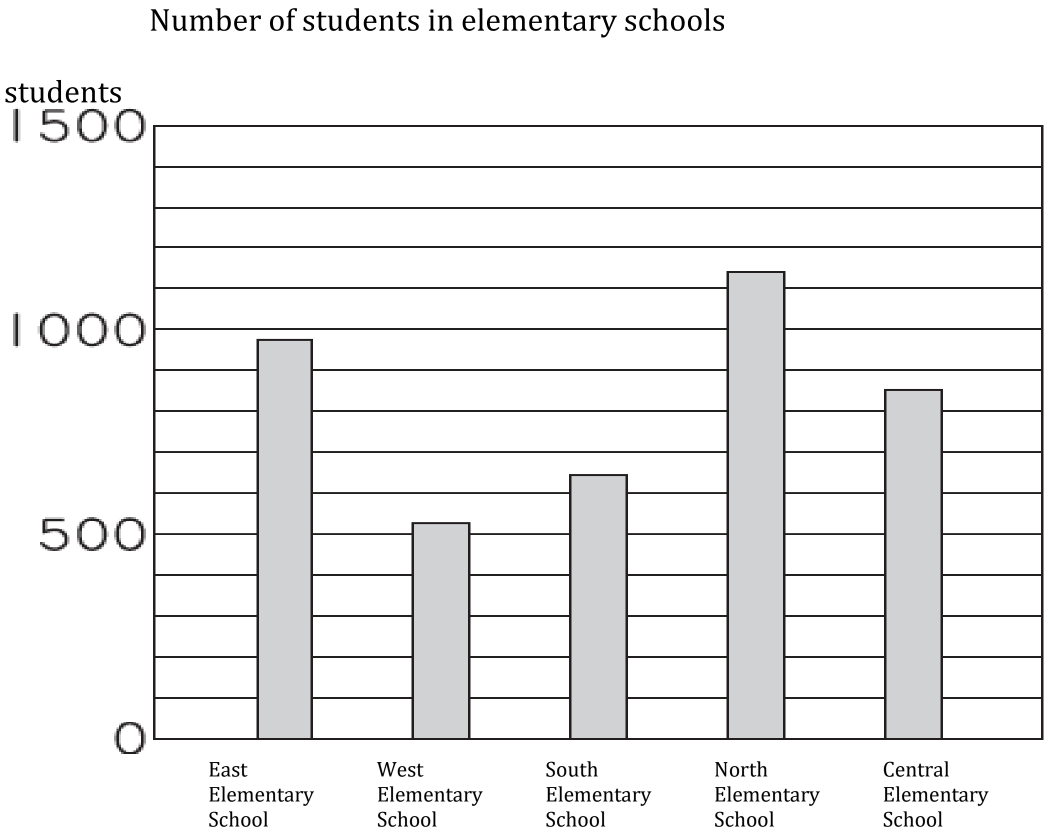
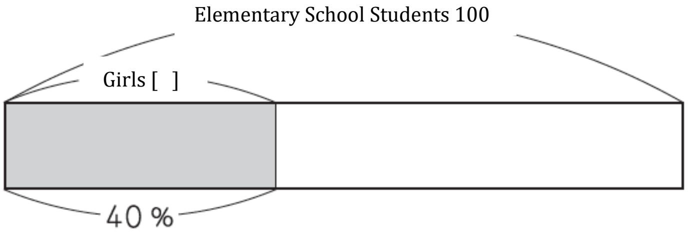
[8] There are 5 elementary schools in the city where Atsuko live.

The bar graphs below show the number of students in those elementary schools.



Which elementary school has the most students? Write your answer.

[9] A group of elementary school students gathered at a certain location.
Of the 100 elementary school students gathered, 40 % were girls.
How many girls were there? Write your answer.
Also, write the expression to calculate the answer.



2011 Problem Set B

[1] Manami and Hideki are going to send books to their friend living in a neighboring prefecture.

They looked into the shipping charges and what they found are shown in the table below.

Shipping charge to the neighboring prefecture

Size of Package	Sum of 3 dimensions (# 1)	Weight	Shipping Charge (# 2)
Size 60	Up to 60 cm	Up to 2 kg	600-yen
Size 80	Up to 80 cm	Up to 5 kg	800-yen
Size 100	Up to 100 cm	Up to 10 kg	1000-yen
Size 120	Up to 120 cm	Up to 15 kg	1200-yen

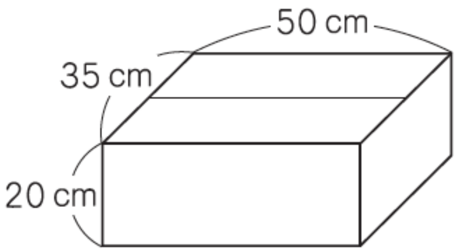
Notes to customers

# 1 "Sum of 3 dimensions" means the total of the length, width and height of the box.

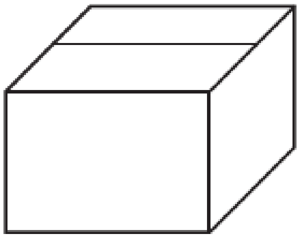
# 2 The shipping charge will be based on the greater of the "sum of 3 dimensions" and "weight."

(1) Manami prepared a box shaped in a rectangular prism as shown below. How many cm is the "sum of 3 dimensions" of the box below? Write your answer.

If we just use the "sum of 3 dimensions," what will be the size of package? Write your answer.



(2) Hideki is going to use the box shown below to send his books. When he checked the "sum of 3 dimensions" and "weight," they were as shown below.



[Sum of 3 dimensions]	75 cm
[Weight]	8.6 kg

What will be the shipping charge for the package above? Write your answer.
Also, write how you determined the shipping charge using words and numbers.

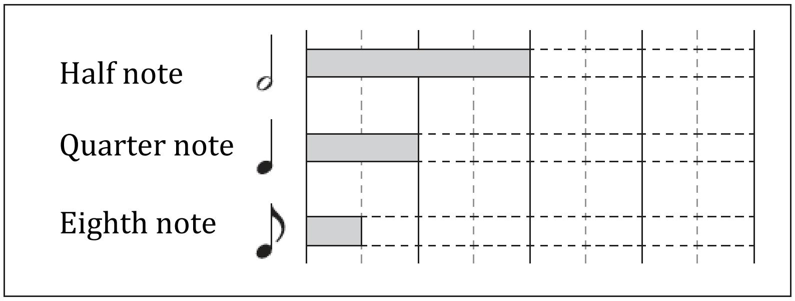
[2] Kazuki learned about the length of different musical notes in the music class.

There are rules for the length of musical notes.

The length of a half note (𝅗𝅥) is twice that of a quarter note (♩).
The length of an eighth note (♪) is 0.5 times as long as that of a quarter note (♩).

If we represent the relationships of the lengths of different musical notes in a diagram, it will be as follows.

Relationship of the lengths of musical notes



(1) How many times as long is the length of a half note (𝅗𝅥) as that of an eighth note (♪)? Write your answer.

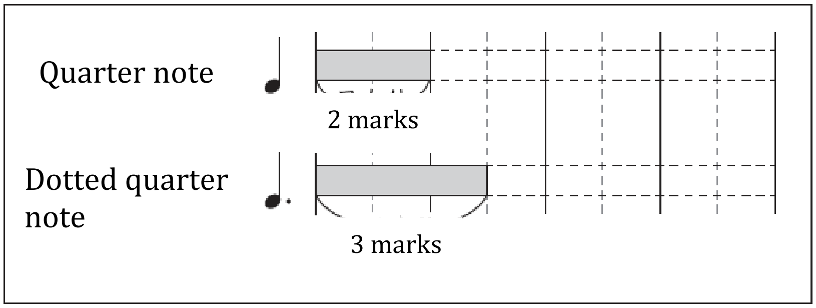
Kazuki investigated the length of dotted notes (♩. and 𝅗𝅥.). He found the following.

> The length of a dotted note is 1.5 times of the length of the original note.

Based on this rule, if we consider the length of a quarter note (♩) to be a set of 2 marks, then the length of a dotted quarter note (♩.) is a set of 3 marks.

If we represent this relationship in a diagram, the relationship of their lengths can be shown as follows.

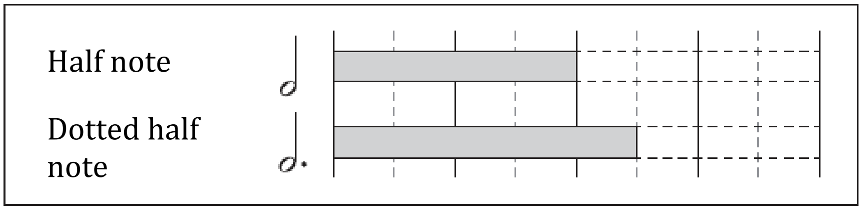
Relationship of the lengths of musical notes



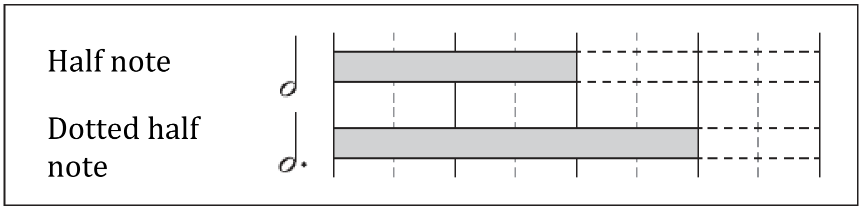
(2) We are going to represent the relationship of the lengths of a half note (𝅗𝅥) and a dotted half note (𝅗𝅥.) in a diagram.

Select the diagram that is representing the relationship of the lengths of these two musical notes from **A** and **B** below and write the letter. Also, write the reason that the selected diagram is the correct one using words and the number of marks.

A


Half note
Dotted half note

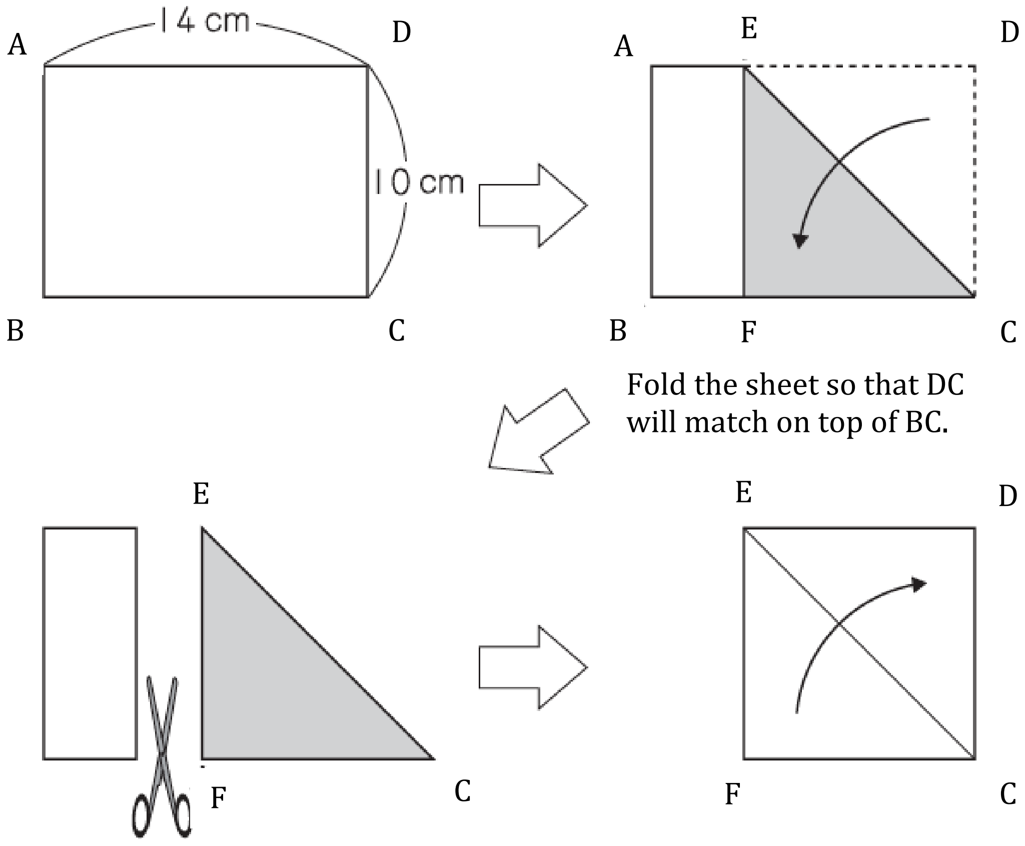
B


Half note
Dotted half note

[3] There is a rectangular piece of paper whose vertical sides are 10 cm long and horizontal sides are 14 cm long.

(1) Yoshiko made a square out of this sheet of paper using the method shown below.

Method



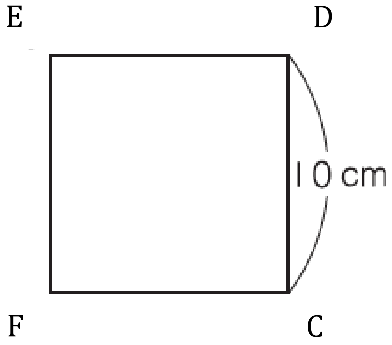
Fold the sheet so that DC will match on top of BC.

Cut the sheet along the line connecting F and E.

Open up the sheet along CE.

Using this method, I made a square with 10 cm sides.

Yoshiko



In Yoshiko's method, she is folding the paper so that which parts of quadrilateral EFCD will be equal?

Select one from each of **1** through **3** and **4** through **6** below and write the numbers.

She folded the sheet so that side CD and and both will be 10 cm long.

1 side DE
2 side FC
3 side FE

will be equal

She folded the sheet so that angle D and right angles.

4 angle C
5 angle E
6 angle F

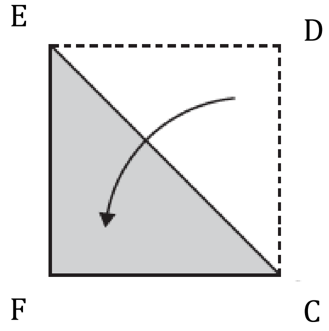
will be both

(2) Hiroshi is checking if Yoshiko's method can really make a square from a rectangular sheet.

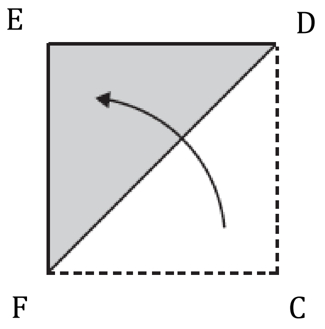
Hiroshi thought if we can fold the quadrilateral EFCD in 2 different ways shown below and the sides match up then we can verify that the quadrilateral is a square.

Is it really a square?

Horoshi



Fold along EC.



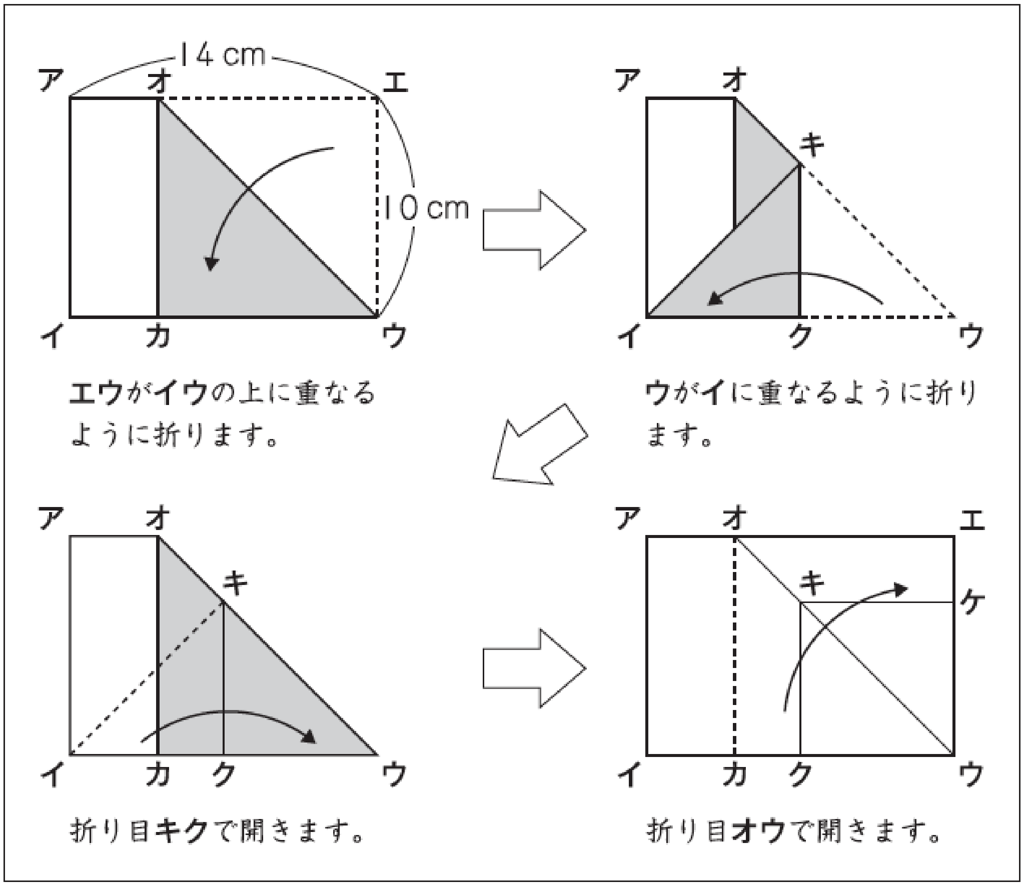
Fold along DF.

When the paper was folded, the sides matched up completely on both cases.

In order to check quadrilateral **EFCD** is a square, what did Hiroshi check by folding it in the 2 different ways? Select the most appropriate one from **1** through **4** below and write the number.

1 The two diagonals are perpendicular.
2 The four sides are equal.
3 The two diagonals are intersecting at their mid-points.
4 The four angles are right angles and the four sides are equal.

(3) Hiroshi folded the same rectangular sheet as shown below.


ア
オ
エ
イ
カ
ウ
14 cm
10 cm
キ
ク
ケ

エウが**イウ**の上に重なるように折ります。

ウが**イ**に重なるように折ります。

折り目**キク**で開きます。

折り目**オウ**で開きます。

A E D

B F C

Fold the sheet so that DC will match on top of BC.

A E

G

B H C

Fold the sheet so that C matches B.

A E

G

B F H C

Open up along GH.

A E D

G

I

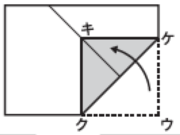
B F H C

Open up along EC.

>>> Insert the figure

When the folded paper was opened up to the original rectangular sheet, quadrilateral GHCI was formed by crease lines.

They match up when you fold it this way, too.



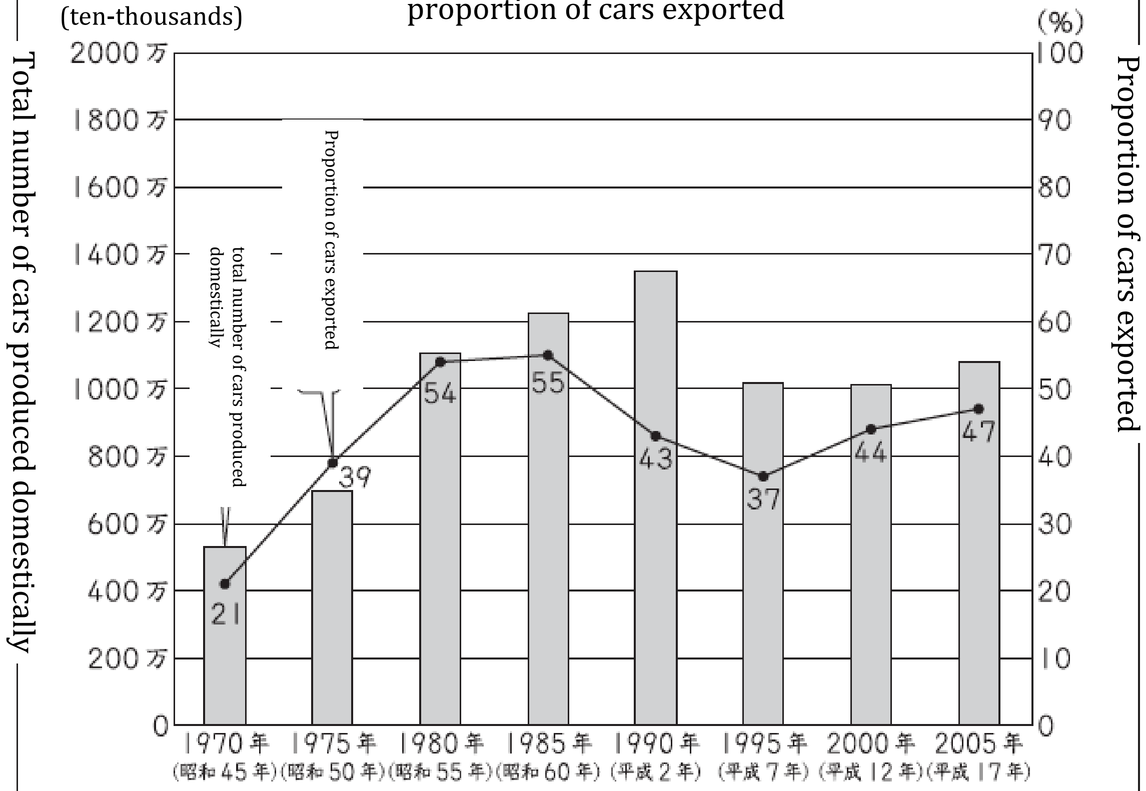
Hiroshi

What kind of shape is quadrilateral GHCI? Write your answer using words and the lengths of sides.

[4] We are looking at the graphs below in the study of Japanese automotive industry during the social study lesson.

The bar graph shows the total number of cars produced domestically in Japan, and the broken line graph shows the proportion of cars that was exported based on the total number of cars produced domestically.

Total number of cars produced domestically and proportion of cars exported



From the Association of Japanese Auto manufacturers homepage

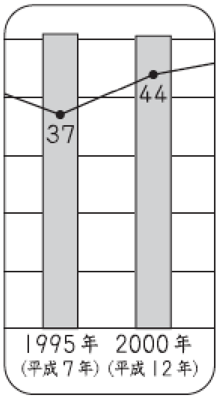
(1) Based on the graphs above, in which year did the total number of cars produced domestically increased but the proportion of cars exported decreased when they are compared to 5 years ago? Write your answer?

(2) The number of cars that were exported can be calculated using the following formula.

Number of cars exported = Number of cars produced domestically × Proportion of cars exported

Consider 1995 and 2000 data shown in the graphs.

We can conclude that the number of cars exported in 2000 was greater than that of 1995.



Select the most appropriate reason for the conclusion from **1** through **4** below and write the number.

1 Because the number of cars produced domestically in 2000 was greater than the number of cars produced domestically in 1995.

2 Because the proportions of cars exported were about the same in 1995 and 2000 but the total number of cars produced domestically was greater in 2000.

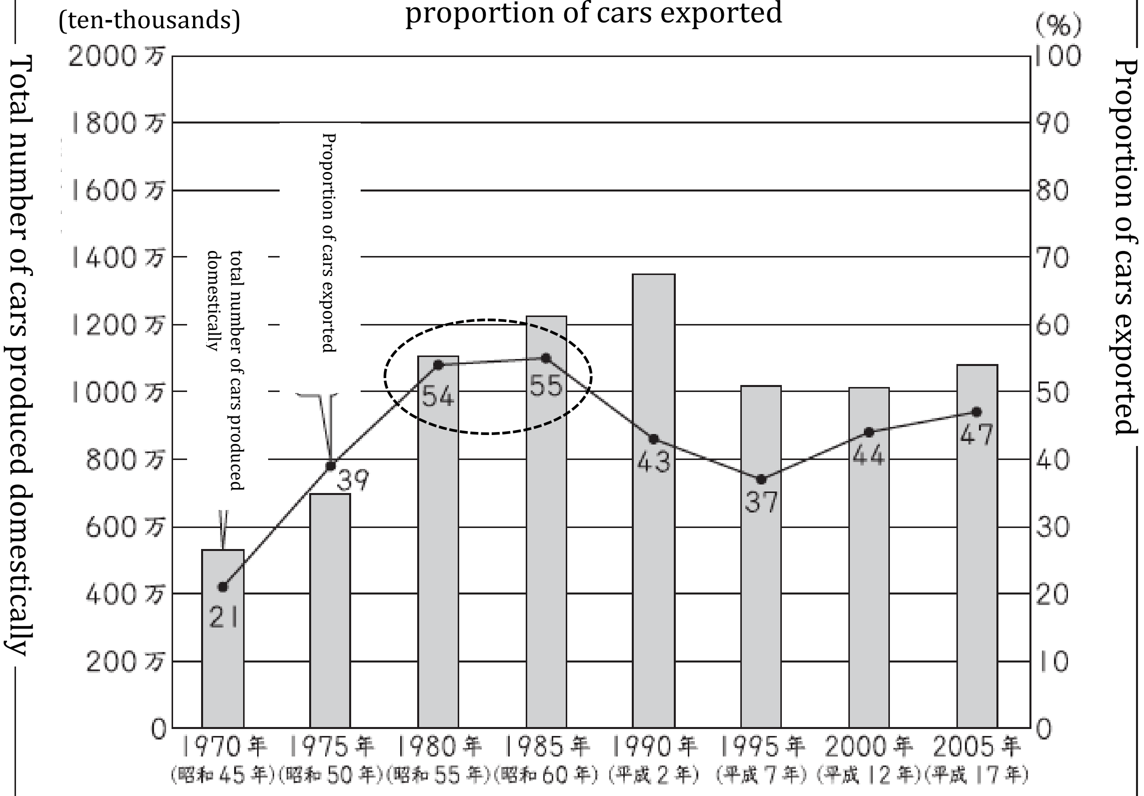
3 Because the proportion of cars exported in 2000 was greater than the proportion of cars exported in 1995.

4 Because the total numbers of cars produced domestically were about the same in 1995 and 2000 but the proportion of cars exported was greater in 2000.

(3) The total number of cars produced domestically can be split into the total number of cars exported and the number of cars that were not exported.

Akiko is looking at the part marked with ◯ in the graphs below to think about the number of cars exported and the number of cars not exported in 1980 and 1985.

Total number of cars produced domestically and proportion of cars exported



From the Association of Japanese Auto manufacturers homepage

Akiko said the following.

Akiko

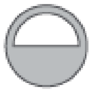
In both 1980 and 1985, I can tell that the number of cars exported was greater than the number of cars not exported in each year.

Write the reason Akiko's statement, "In both 1980 and 1985, I can tell that the number of cars exported was greater than the number of cars not exported in each year," is correct using words and numbers.

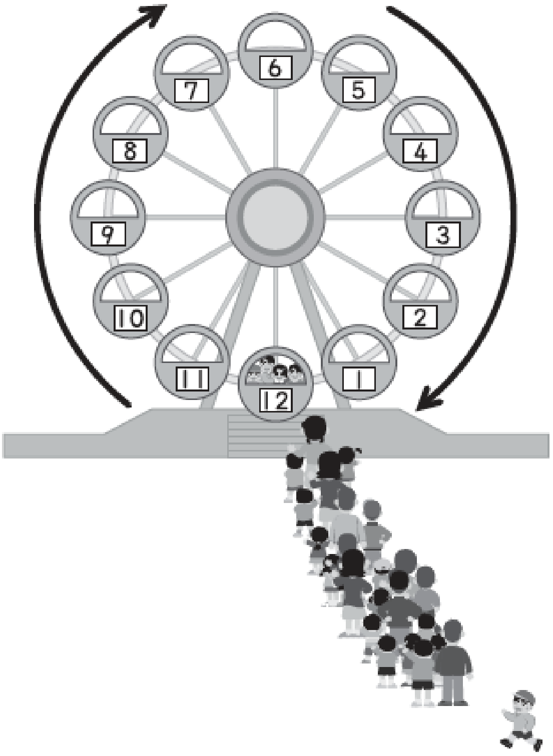
[5] Kenta went to an amusement park.

At the amusement park, there was a Ferris wheel like the one shown below.

The passenger cars on the Ferris wheel was moving in the direction of the arrow (↷) in the figure.



Passenger car
Capacity 4



(1) Kenta joined at the end of the line to get on the Ferris wheel.
He noticed that the 4 people at the front of the line got on the car [12].

There are still 24 people in front of Kenta.

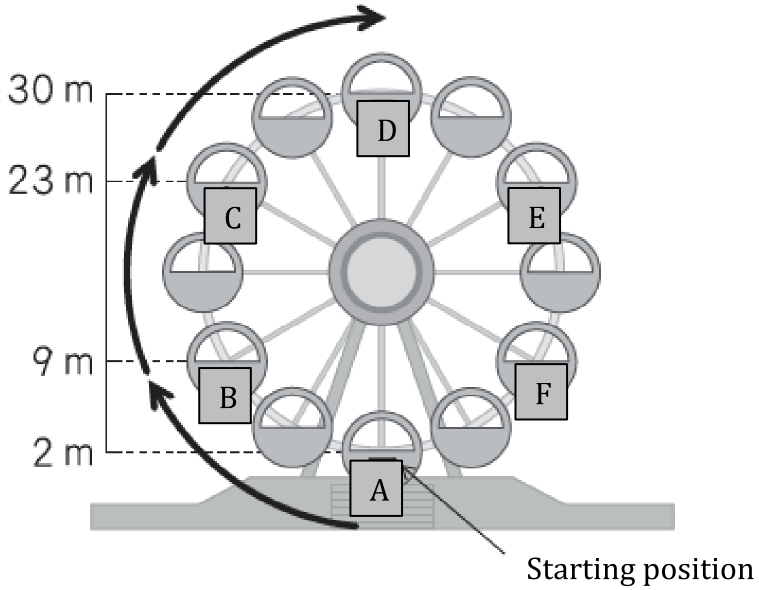
Up to 4 people can ride in each passenger car.

If the line moves the quickest, in which car [1] through [12] will Kenta get on? Write your answer.

After getting off the Ferris wheel, Kenta told the following observation to a park attendant.

[Kenta's comment]
When the car was moving up, I felt it was going up more quickly in the middle.

Then, the park attendant gave the following explanation using the diagram and table below.



Time from the beginning of the ride and the height from the ground

Position of the car	A	B	C	D	E	F	A
Time from the beginning (min)	0	1	2	3	4	5	6
Height from the ground (m)	2	9	23	30	23	9	2

7 14 7
Difference in height (m)

[Explanation of the park attendant]

The way a passenger car goes up each minute is different depending on its position.
From A to B, it goes up 7 m.
From B to C, it goes up 14 m.
From C to D, it goes up 7 m.
Even though the time interval is all 1 minute, the difference in heights between B and C is greater.
That's the reason you felt that the car was going up faster in the middle.

(2) Kenta decided to investigate how the car moved downward using the table.

Time from the beginning of the ride and the height from the ground

Position of the car	A	B	C	D	E	F	A
Time from the beginning (min)	0	1	2	3	4	5	6
Height from the ground (m)	2	9	23	30	23	9	2

7
Difference in height (m)

From the table, he knew that the passenger car goes down 7 m from D to E.

How many m does the passenger car go down from E to F? From F to A? Write the answers.

(3) Kenta noticed that the passenger car was going down faster in the middle of going from D to A. If we try to explain this in the same way the park attendant did, what will it be like?

In the ⬚ below, write words and number of the explanation.

Also, in ( ), write the letters from **A** through **G**.

Write all your answers on the answer sheet.

[Explanation]

The way a passenger car goes down each minute is different depending on its position.
From D to E, it goes down 7 m.

Write your answer on the answer sheet.

Even though the time interval is all 1 minute, the difference in heights between ( ) and ( ) is greater.
That's the reason you felt that the car was going down faster in the middle.