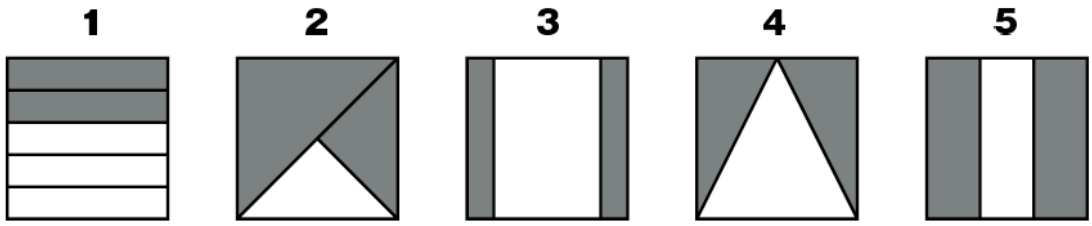
Grade 6

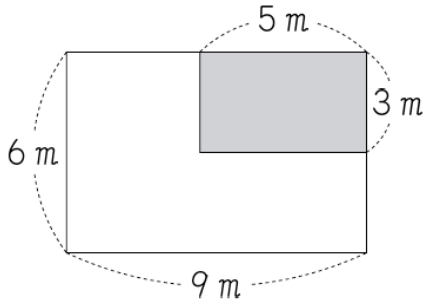
Problem A-2 (89.3%)

Which of the following figures 1 through 5 is 2/3 shaded? Answer with the numeral.



Problem B-1(2) (88.2%)

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



Miki is going to plant tulips in the  region in the flowerbed. From the mathematical expressions 1 through 4 below, select the one that can be used to calculate the area of this region.

1. $5 \times 3 + 3 \times 9$
2. $3 \times 6 + 5 \times 3$
3. $6 \times 9 + 3 \times 5$
4. $3 \times 9 + 3 \times 5$

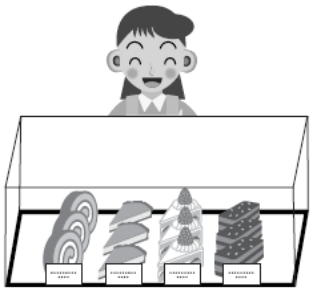
Problem A-4 (54.3%)

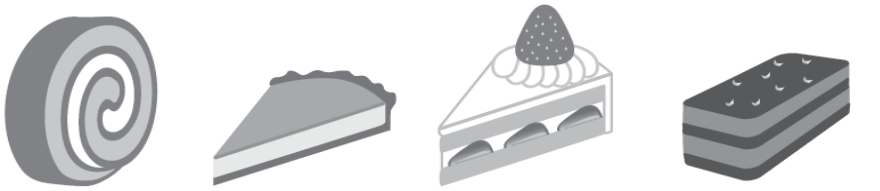
From the problems below, select one that may be solved by using 210×0.6. Answer with $1 \sim 4$.

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?

Problem B-4(2) (59.3%)

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.



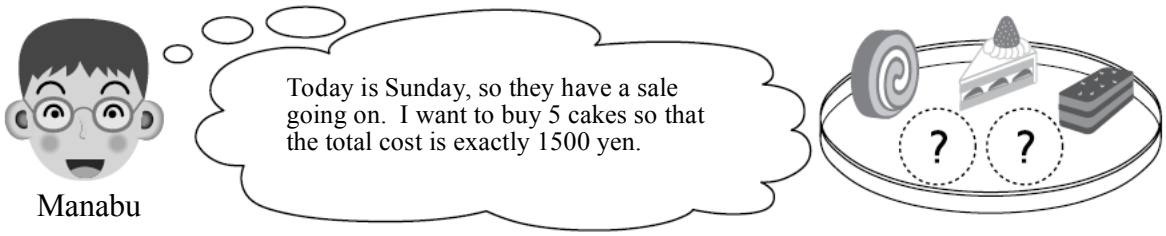


Rolled cake	Cheese cake	Strawberry cake	Chocolate cake
250 yen	300 yen	350 yen	400 yen

One 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 320 yen or less will be sold for 200 yen.

(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.

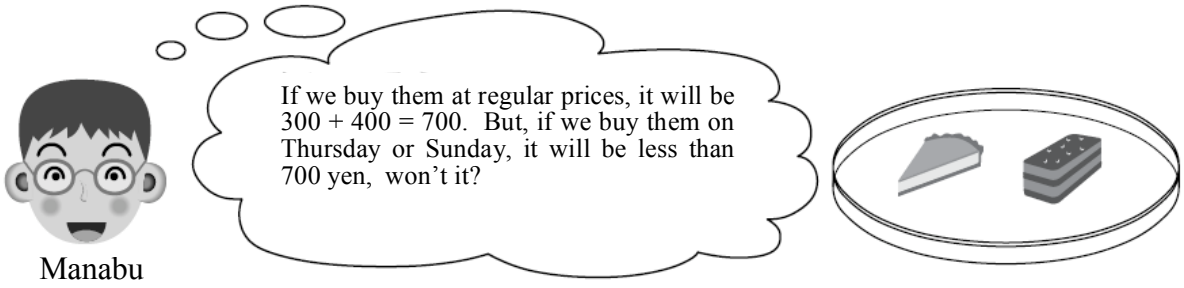


For the other two cakes, how many of which cakes might he pick? Give one possible answer.

Problems B- 4(1) (29.5%)

[See B-4(2) above for the set up of the problem.]

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



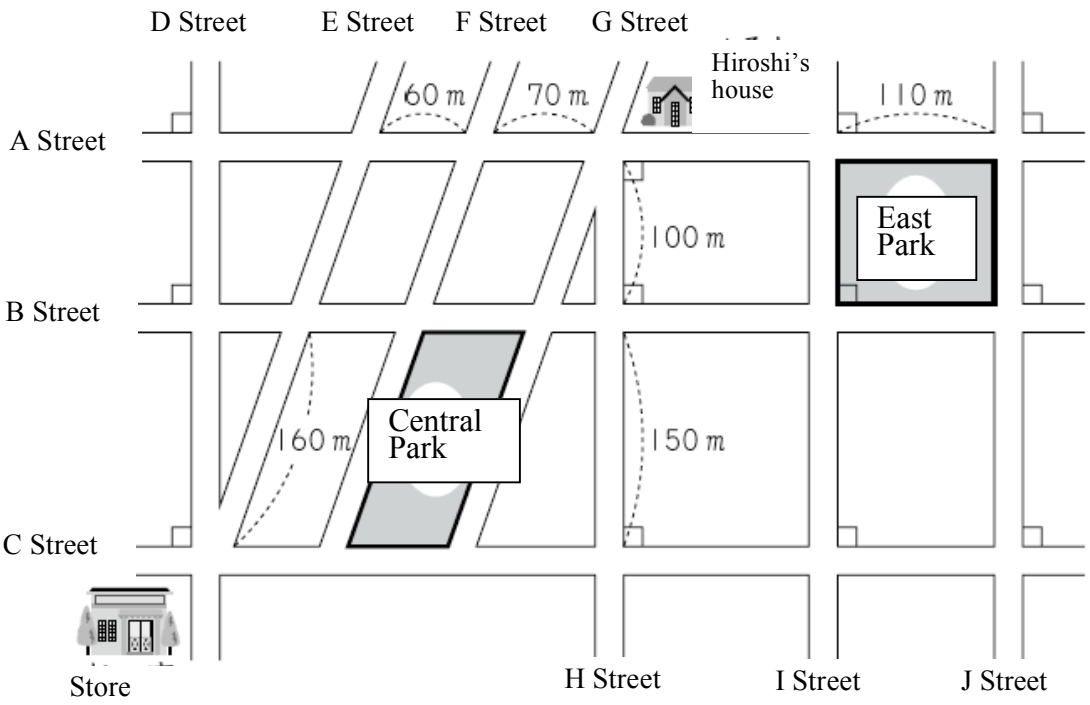
Manabu

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.

Problem B-5(3) (18.2%)

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 expressions.

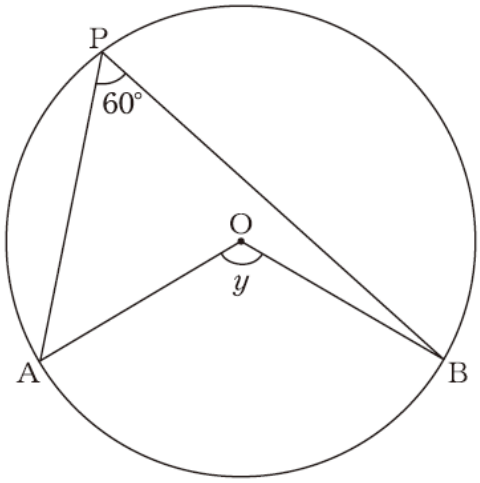


- A, B and C Streets are all perpendicular to I Street.
- A, B, and C Streets are all perpendicular to J Street.

Grade 9

Problem A-6(2) (85.8%)

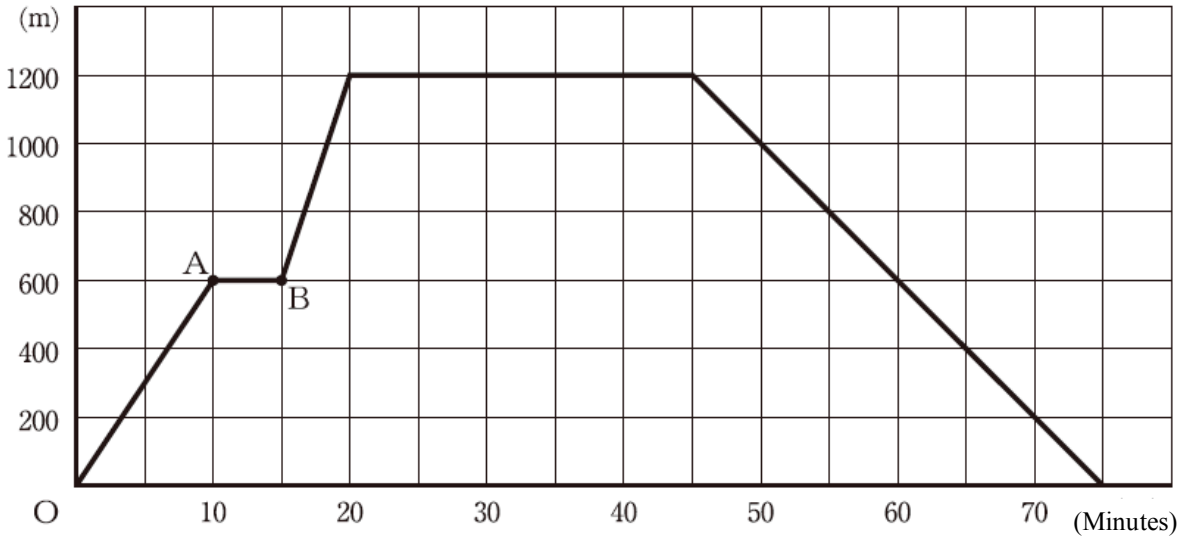
In the figure below, points A, B and P are on circle O. Moreover, $\angle APB = 60°$. Find the measure of $\angle y$.



Problem B-6(1) (88.9%)

Misaki went to the library to check out some books. The library is 1200 meters from her house. At a park on the way to the library, Misaki chatted with her friend for a little while before continuing on to the library. After she checked out the books, she directly came home along the same route without stopping at the park.

The graph below shows the relationship between the time after she left her house and the distance from the house.



What was Misaki doing during the time between points A and B on the graph?

Problem A-14(1) (49.9%)

When a die is rolled, the probability of rolling a 1 is 1/6. What can we say about rolling this die? Select one correct statement from the following statements A through E.

A. After you rolled the die five times without rolling a 1, you will certainly roll a 1 on the next roll.
B. If you roll the die six times, you will roll a 1 at least once.
C. If you roll the die six times, you will roll each of 1 through 6 once.
D. If you roll the die 30 times, you will roll a 1 exactly 5 times.
E. If you roll the die 3000 times, you will roll a 1 about 500 times.

Problem B-2(1) (56.0%)

Taro is investigating the sums of 3 consecutive natural numbers.

When three numbers are 1, 2, and 3, 1+2+3=6

When three numbers are 2, 3, and 4, 2+3+4=9

When three numbers are 3, 4, and 5, 3+4+5=12

From these results, he conjectured that the sum of three consecutive natural numbers will be a multiple of 3. He justified his conjecture as shown below.

Taro's justification:

Let's call the smallest of the three natural numbers n.

Then, the three numbers can be written as n, $n + 1$, and $n + 2$.

Therefore, their sums is

$$n + (n + 1) + (n + 2) = n + n + 1 + n + 2$$
$$= 3n + 3$$
$$= 3(n + 1)$$

Since $n + 1$ is a natural number, $3(n + 1)$ is a multiple of 3.

In addition to the conclusion,

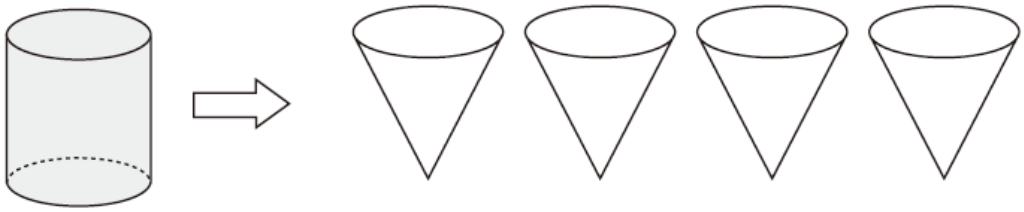
the sum of 3 consecutive natural numbers is a multiple of 3,

there is another conclusion that can be drawn from the last expression in Taro's justification, $3(n + 1)$. Select the correct conclusion that can be drawn from the following statements A through E.

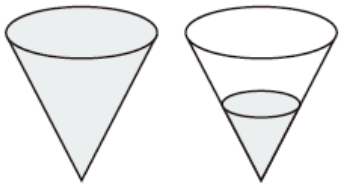
A. The sum of 3 consecutive natural numbers is an odd number.
B. The sum of 3 consecutive natural numbers is an even number.
C. The sum of 3 consecutive natural numbers is 3 times as much as the smallest of the three numbers.
D. The sum of 3 consecutive natural numbers is 3 times as much as the middle number of the three.
E. The sum of 3 consecutive natural numbers is 3 times as much as the largest of the three numbers.

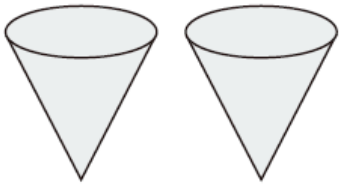
Problem A-5(4) (38.1%)

The picture below shows two containers, a cylinder and a cone. Their circular bases are congruent to each other, and their heights are also equal. The cylindrical container is filled with water, and we will transfer the water into the cone-shaped containers.

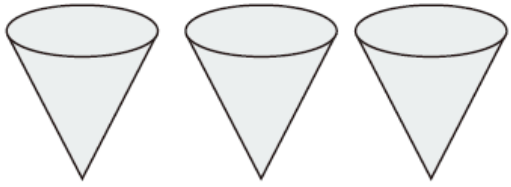


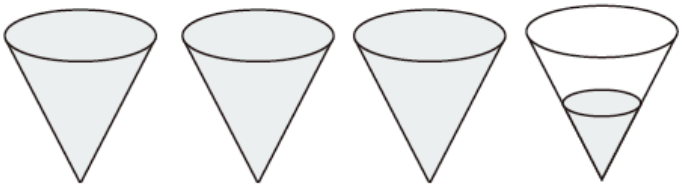
One of the pictures A through E show how the cone-shaped containers will be filled up after all the water from the cylindrical container is transferred. Select the correct picture.

A 

B 

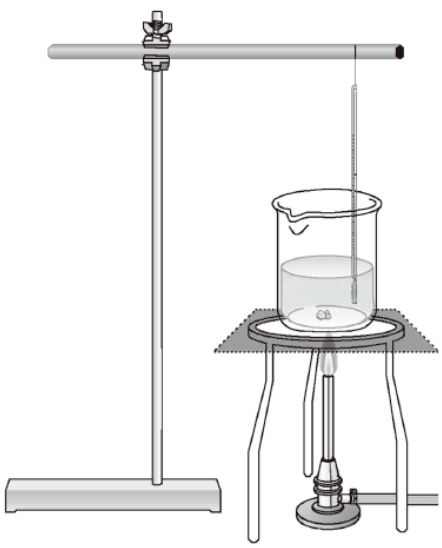
C 

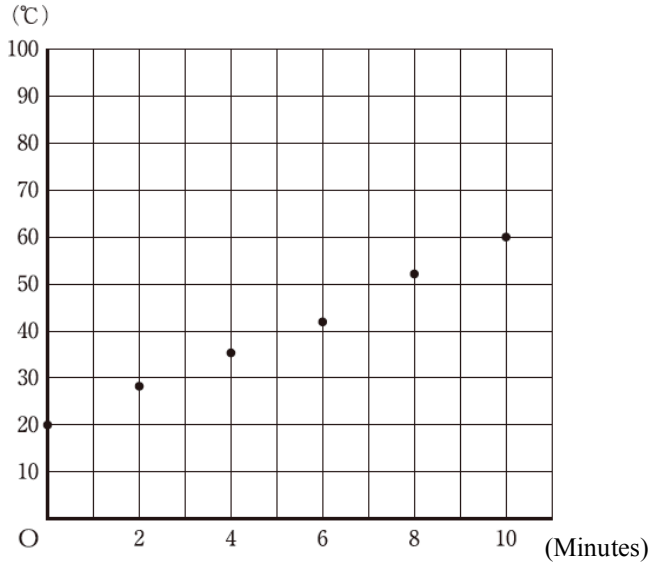
D 

E 

Problem B-5(2) (32.1%)

In a science class, we conducted an experiment to determine how water temperature changes as it is heated. The graph below shows the changes in water temperature every two minutes from the time we began heating the water until 10 minutes after the experiment began.





As Yoko observed the graph, she thought that “if we consider the water temperature at x minutes after we started heating the water is y C°, we can say that y is a linear function of x.” From what characteristic of the graph, can we conclude that “y is a linear function of x”? Explain that characteristic.