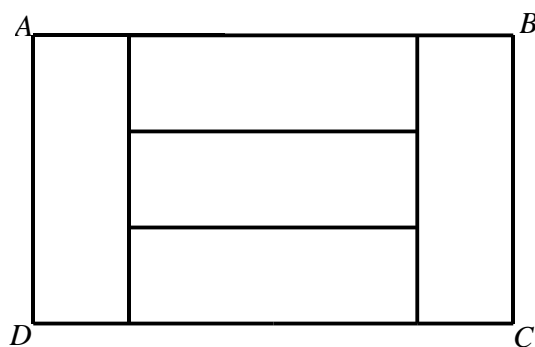# 2014 NMOS Question

1. If 2014 is added to a number, the result is 20 times of the number. What is the number?

2. The figure below shows a rectangle *ABCD* which is divided into 5 identical rectangles. The area of the rectangle *ABCD* is 135 cm^2. Find the perimeter (in cm) of the rectangle *ABCD*.

3. The measures of angles *A, B* and *C* of the triangle *ABC* are in the ratio $5:12:13$. What is the measure, in degrees, of the largest angle?

4. The figure below is made up of 6 identical squares. Given that $\dfrac{5}{N}$ of the whole figure is shaded, find the value of N.
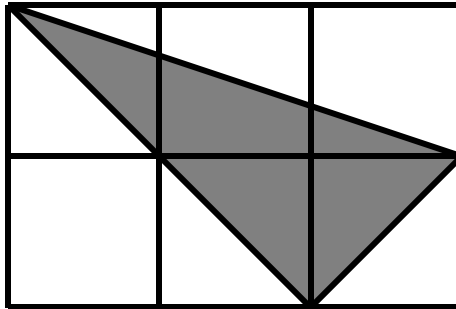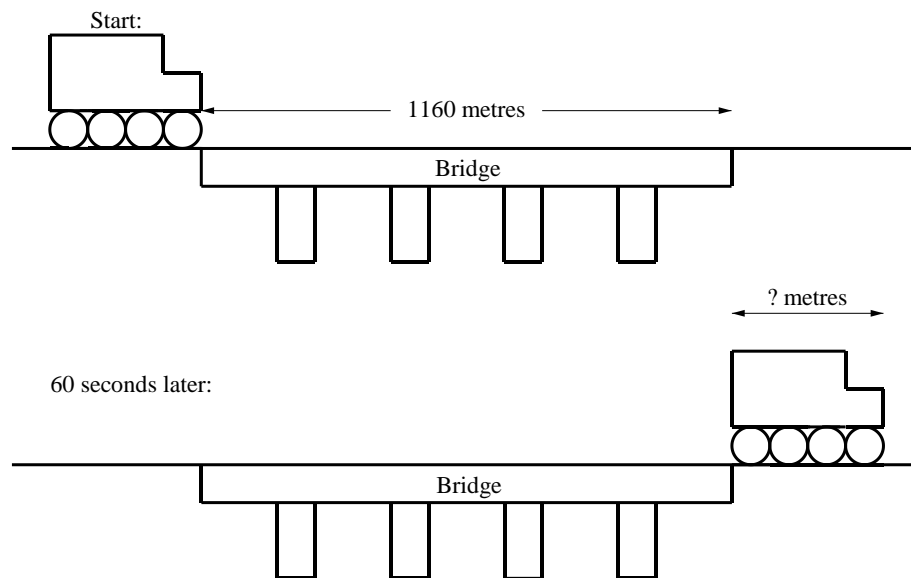

5. Study the following pattern:

$$
\begin{aligned}
1 &= 1 = 1 \times 1 \\
1 + 3 &= 4 = 2 \times 2 \\
1 + 3 + 5 &= 9 = 3 \times 3 \\
1 + 3 + 5 + 7 &= 16 = 4 \times 4 \\
1 + 3 + 5 + 7 + 9 &= 25 = 5 \times 5
\end{aligned}
$$

What is the smallest, odd number n such that $1 + 3 + 5 + 7 + \cdots + n > 200$?

6. It takes 60 seconds for a train to cross a bridge 1160 metres long when travelling at 20m/s. What is the length of the train? (Round off your answer to the nearest metre.)

Start:

1160 metres

Bridge

? metres

60 seconds later:

Bridge

7. The average of five numbers is 50. After one new number is added in, the average of these six numbers is 46. What is the value of this new number?

8. The following bar chart shows the responses made by pupils in a particular multiple-choice question. Each pupil selected one of the possible choices and answer is D. Find the percentage of pupils who answered this question correctly.

Number
of pupils

A   B   C   D   E
Responses
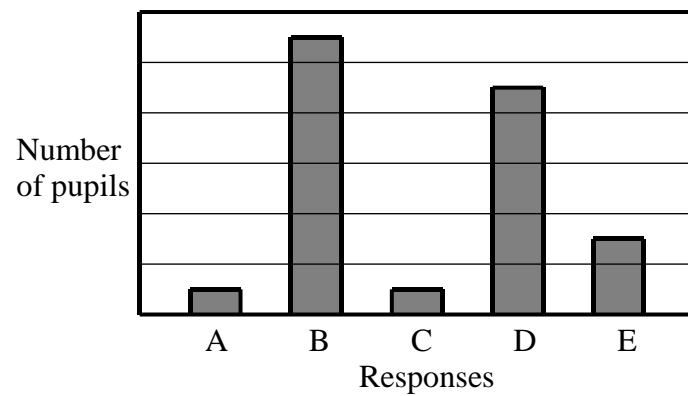
9. A bicycle travels at a constant speed of 15 km/h. A bus starts 90 km behind the bicycle and travels at a constant speed of 75 km/h. How many minutes later will the bus catch up to the bicycle?

10. The figure below shows a square and a rectangle. The square is of length 2014 cm while the rectangle is of length 2018 cm and breadth 2010 cm. Find the difference of their areas (in cm^2).

2014 cm

2018 cm

2014 cm

2010 cm
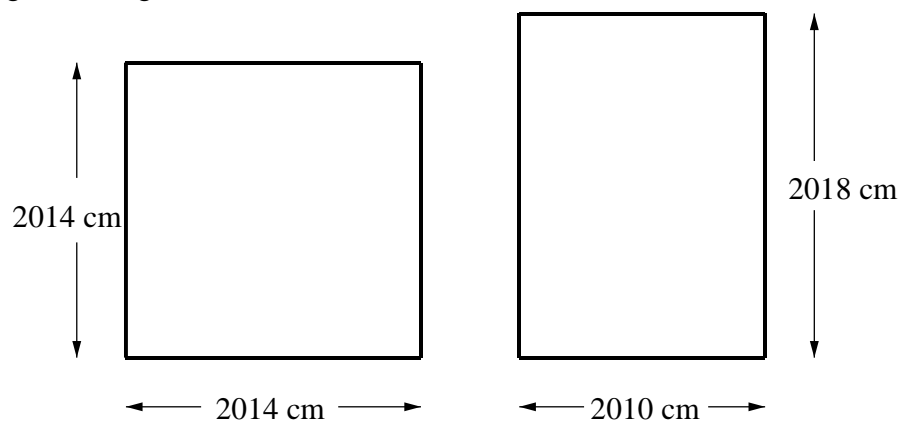
11. At first, the ratio of Abel's savings to Bell's savings was $7:5$. After each of them received $ 12 from their parent, the ratio of Abel's savings to Bell's savings became $5:4$. What was Bell's savings (in $) at first?

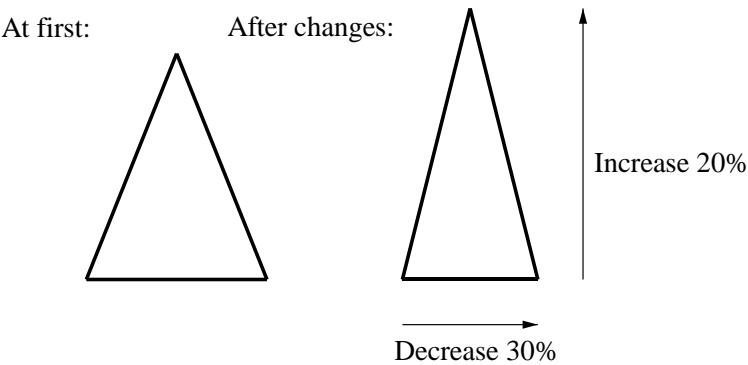12. In the figure below, find the value of x.
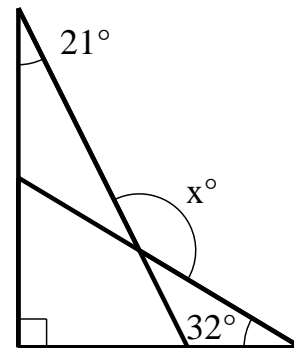
13. Evaluate:

$$2014 \times \left(\frac{1}{962} + \frac{2}{45} \right) + 1969 \times \left(\frac{1}{2014} - \frac{2}{45} \right) + 45 \times \left(\frac{1}{2014} - \frac{2}{962} \right).$$

14. What is the percentage decrease in the area of a triangle if the height of the triangle is increased by 20% and its base is decreased by 30%?

At first: After changes:


Increase 20%

Decrease 30%

15. Julie drove from Singapore to Kuala Lumpur at an average speed of 80 km/h. On her way back to Singapore, her average speed was 96 km/h. What was her average speed for the whole journey? (Round off your answer to the nearest km/h.)

16. The numbers 1, 2, 3, 4 and 5 are filled in the following 5×5 square grid, such that each number appears only once in each row and in each column. Find the sum of the numbers to be filled in the shaded squares.

1	2			
				1
		4		
2		5		
	5			4

17. A big cube is made up of $5 \times 5 \times 5$ unit smaller cubes. If the centre piece on each face and all the corner pieces are removed, find the surface area of the remaining structure.

18. The figure below shows 4 points (*A, B, C* and *D*) lying on a line segment. Given that $\frac{AB}{BC} = \frac{BC}{CD} = \frac{2}{3}$ and that *AD*= 2014 cm, find the length of *AB* (in cm).

A   B   C   D
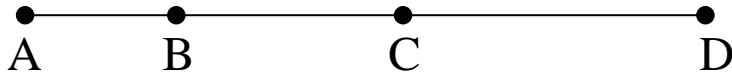
19. A father says to his son, "When I was your age, you were 2 years old." His son replies: "When I reach your age, you will be 68 years old." What is the father's present age?

20. *AF, BC* and *DE* are straight line segments, and they meet at the common point *G*. Given that

$\angle GAB = \angle GBA = 42°$, $\angle GDC = \angle GEF = 90°$ and that $\angle GFE = 2\angle GCD$, find (in degrees) $\angle GFE$.
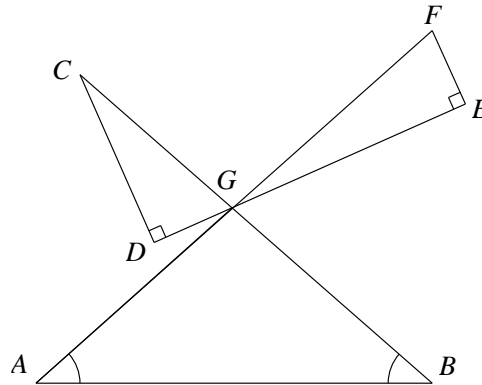

21. On Monday, Samuel goes to school. If he walks there at an average speed of 60 m/min, he will arrive 6 minutes late. If he runs there at 100 m/min, he will arrive 2 minutes early. What is Samuel's speed (in m/min) so that he can reach school on time? (Round off your answer to the nearest m/min.)

22. The numbers 21, 22, 23 and 24 are four consecutive whole numbers and their sum is equal to 90. Given that the sum of fifty-three consecutive whole numbers is equal to 2014, find the largest number among these fifty-three numbers.

23. The figure below is made up of six identical rectangles (with dimension 5 cm by 10 cm). Find

the area (in cm²) of the shaded region.
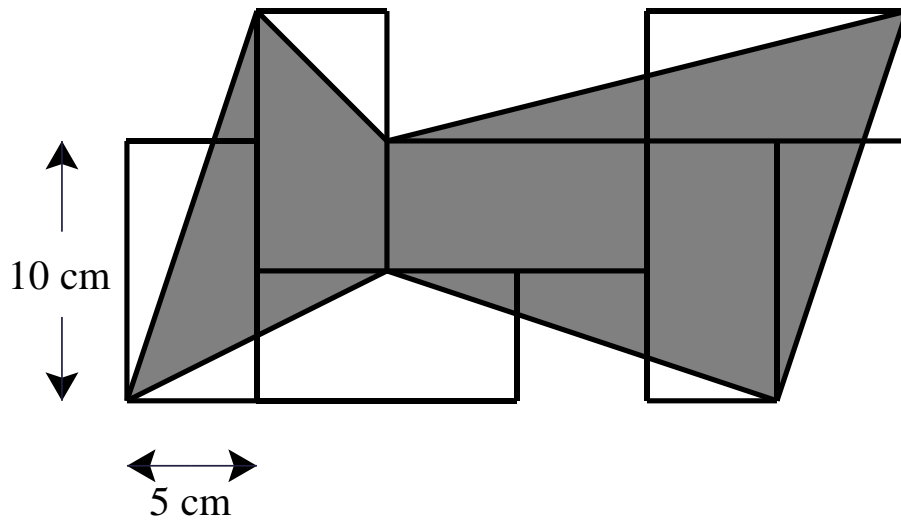
24. Daryl takes 4 days to repair 10 cars and 24 motorcycles. He takes 6 days to repair 12 cars ad 48 motorcycles. How many motorcycles can Daryl repair in 5 days? (Assume he does not repair any cars and he repairs only motorcycles at the same rate in the 5 days.)

25. Note that the number 13458 is double of the number 6729 and that these two numbers together use the digits 1 to 9 once and only once. Given that the 5-digit number $\overline{1abcd}$ is double of the 4-digit number $\overline{9ef3}$ and these two numbers together use the digits 1 to 9 once and only once, find the 4-digit number $\overline{abcd}$.

26. The figure below shows three parallelograms (*ABZF*, *BCXD* and *CAYE*) and a triangle *ABC*. It is known that points *A, B* and *C* are on the line segments *CF, AD* and *BE* respectively such that $AF = 2AC$, $AB = BD$ and $BC = 2CE$. If the area of triangle *ABC* is 1001 cm², find the total area (in cm²) of the shaded regions.
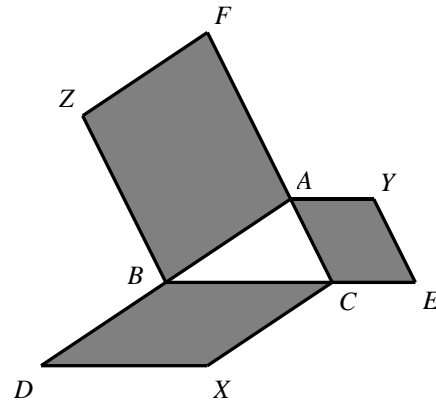
27. It is known that $5 \times 6 \times 7 \times 8 \times 9 \times 10 = 1512 \times 10^2$ and that 2 is the largest value of *n* when $5 \times 6 \times 7 \times 8 \times 9 \times 10$ is written as $A \times 10^n$ (where *A* is a whole number). What is the largest value of *m* if $5 \times 8 \times 11 \times 14 \times 17 \times 20 \times \cdots \times 95 \times 98 \times 101$ is written as $B \times 10^m$ (where *B* is a whole number)?

28. Albert, Ben and Cheryl play badminton with the following rule: " When two of them play the game, the third one becomes the referee. "   At the end of each game, the referee will challenge the winner while the loser becomes the referee for the next game. So far, Albert has played 19 games, Ben has played 23 games and Cheryl has been the referee for 11 games. How many games have they played?

29. The figure below shows six identical circles and a larger circle with diameter 8 cm. Find the area (in cm²) of the shaded region. (Use $\pi = \dfrac{22}{7}$ and round off your answer to the nearest cm².)

8 cm
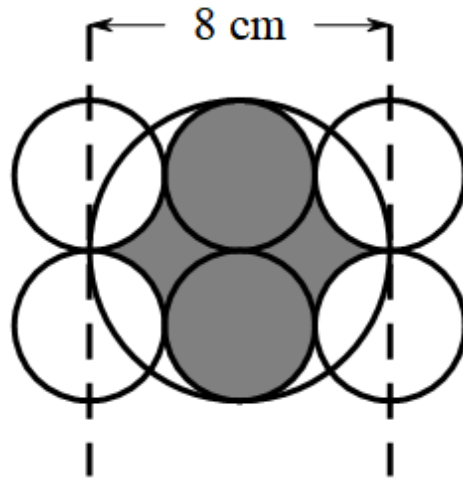
30. Aaron, Betty, Calvin, Diana and Edward ate 21 cakes altogether. They took turns to eat their share. After each of them finished their share, they told the group how much they had eaten. You are not told who ate the cakes first, but you are told what they had said.

Aaron said: "I have eaten $\dfrac{2}{3}$ of the remaining. "

Betty said: "I have eaten half of the remaining."
Calvin said: "I have eaten half of the remaining."
Diana said: "I have eaten all of the remaining. "
Edward said: "The numbers of cakes eaten by us are all different whole numbers."
What is the number of cakes Edward has eaten?