2022 NMOS Preliminary Round Question

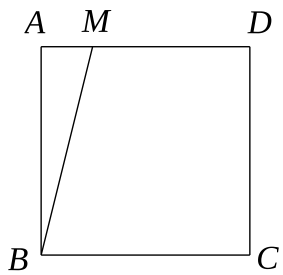
1. $150 \times 2.022 + 2.1 \times 202.2 + 11 \times 20.22 + 0.03 \times 2022$

2. A class of students are given some tests. The average total of all scores is 255. The average score for mother tongue is 90. The average Mathematics score is 25 less than the average English score. What is the average English score?

3. The area of a square is $\frac{25}{576}$ cm^2. The side length is $\frac{m}{n}$ in its simplest form. Find $m + n$.

4. Person A is 3 years older than person B. The age of person A in 2 years is twice the age of person B 4 years ago. Find the age of person B now.

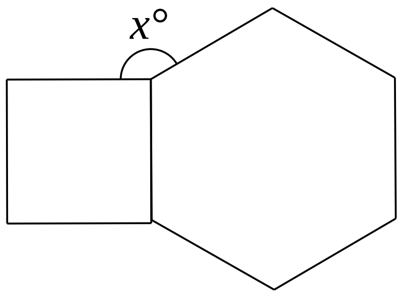
5. In square $ABCD$, M is a point on AD and $AD = 4AM$. If the perimeter of trapezium $BCDM$ is 30cm longer than the perimeter of triangle ABM. Find the length of AD.



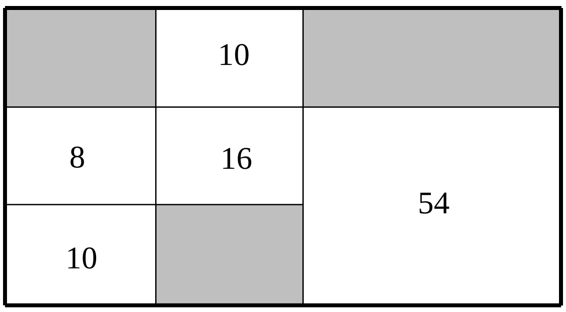
6. Andy and Bob collect erasers. Initially their erasers are $3:7$. After Bob gave 28 to Andy, now their erasers are $5:9$. What is the total number of erasers?

7. What day is the 15th of July where July has 4 Mondays and 4 Thursdays? (July has 31 days)

8. *ABCDEF* is regular hexagon. *GHFA* is a square. Find $x°$



9. The areas of several rectangles are provided below. Find the total area of the three shaded parts.

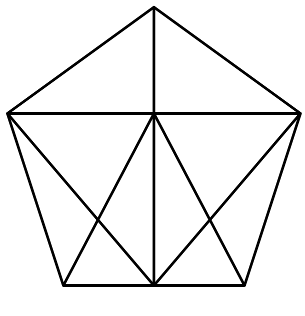


10. Jake is playing a computer game. He has to shoot down Zombies with a gun (infinite bullet). Jake will miss his every 4th shot. It takes 2 bullets to kill a Zombie. If the gun can shoot 10 bullets every second, how many Zombies can Jake kill in 100 seconds. (Assume that there are infinite Zombies and Jake will hit a Zombie with his every shot except for his every 4th shot)

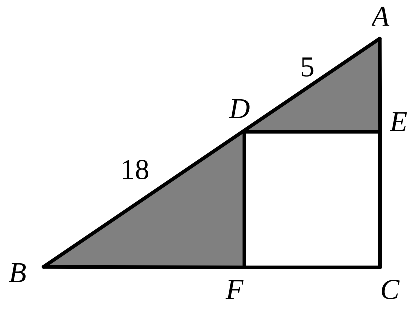
11. The letters *C, O, V, I, D, N, T, A, R, G* represents different number from 0~9. If $C = 2$, find the value of $G + R + I + T$.

$$
\begin{array}{cccccccc}
 & & & C & O & V & I & D \\
+ & C & O & N & T & A & C & T \\
\hline
 & T & R & A & C & I & N & G
\end{array}
$$

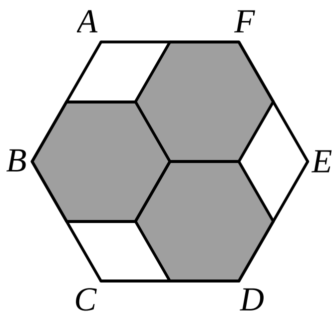
12. How many triangles are there in the figure below?



13. In the Diagram below, $\triangle ABC$, $\triangle ADE$ and $\triangle DBF$ are right angled triangles, and $DFCE$ is a square. Given that $AD = 5$ cm and $BD = 18$ cm, find the total area of the shaded regions in cm^2.

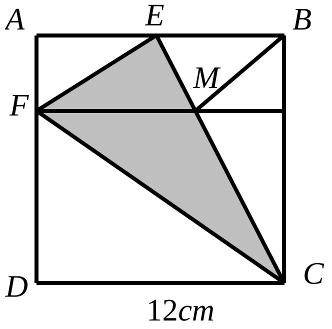


14. $ABCDEF$ is a regular hexagon, and its area is 48. In $ABCDEF$, there are three identical regular hexagons. Find the total area of the three small hexagons.



15. There are two numbers, P and Q, which are prime numbers. Given that $3 \times P + 5 \times Q = 121$, and the sum of P and Q is a square number, find the result of $Q - P$?

16. The figure is a square. Given that $ECF = 48cm^2$, find the area of $\triangle BMC$.



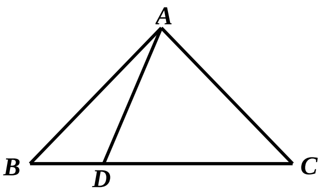
17. There is an infinitely long running track where sticker stations are placed every 1m. An athlete runs from the start of the track to the first sticker station, then collects the sticker, runs back to the starting line before running to the second sticker station, then run back to the starting line, and so on. When the athlete has run for 950m, how many stickers has he collected.

18. A train takes 45 seconds to cross an 820m bridge and 35 seconds to cross a 620m bridge. What is the speed of the train? (in m/sec)

19. Find the average of all 4-digit numbers formed with the digits 2,3,7,8.

20. Three people, Ali, Betty, Charlie are good at 3 different sports, swimming, volleyball, badminton and they are in P3, P4, P5 (not in order).
Ali is not P3.
Betty is not P4.
The one who is good at volleyball is not P5.
The one who is good at swimming is P3.
Betty is not good at swimming.
Who is good at badminton?
If your answer is Ali, shade 201.
If your answer is Betty, shade 202.
If your answer is Charlie, shade 203.

21. $\angle ABC = \angle ACB$, $\angle DAC = \angle ADC$, $\angle BAD = 21°$, find $\angle ABC$.



22. A luxury shop sells camera and suitcases. At first 45% of the items were suitcases. After 12 suitcases and 28 cameras were sold, 60% of the items were suitcases. Find the total number of items that remain unsold.

23. It's defined that $\langle x \rangle = \frac{x}{x+1}$,

Let $M = \left\langle \frac{1}{2022} \right\rangle + \left\langle \frac{1}{2021} \right\rangle + \left\langle \frac{1}{2020} \right\rangle + \cdots + \left\langle \frac{1}{2} \right\rangle + \langle 1 \rangle + \langle 2 \rangle + \cdots + \langle 2022 \rangle$.

Find the value of $2M$.

24. There are 3852 red and blue marbles. After giving away $\frac{3}{7}$ red marbles and 52% of blue marbles, the red marbles are $\frac{25}{3}$ percent of the blue marbles. Find the total number of red marbles at first.

25. How many 8-digit positive integers are there that only contain digits “0” and”4”, and is a multiple of 75?

26. From 5:00 a.m. to 12:00 noon of the same day, how many times will the minute and the hour hand form an angle of 120°?

27. What is the largest integer that does not exceed $\dfrac{1}{\frac{1}{201}+\frac{1}{202}+\frac{1}{203}}$.

28. A company needs to finish 5 jobs in the shortest period of time. There is only 1 machine for each stage. For each stage, only 1 job can be carried out at any time. Each job needs to complete Stage 1 before proceeding to Stage2. What is the shortest time to complete all jobs for both stages?

	Stage 1 (sec)	Stage 2 (sec)
Job A	68	37
Job B	82	74
Job C	30	88
Job D	52	8
Job E	28	51

29. How many ways are there to give 20 sweets to 3 children, such that each of them gets at least 5 sweets.

30. Tom and Peter are taking part in a test. Both answered all the questions. Tom answered $\frac{3}{4}$ of the questions correctly, while Peter answered 5 questions wrongly. It is known that the number of questions both of them got correct is more than half of the total number of questions. If the questions they both answered wrongly is $\frac{1}{6}$ of all questions, how many questions did they both answer correctly?