



International
ONLINE **M**ath
 Challenge

Online International Math Challenge

Past Papers 2021

Category 1

www.mathchallenge.in.th



@intmathchallenge

Preface

International Math Challenge (IMC) is one of the leading mathematics-based international competitions in the world aimed at school students of various grades. As an IMC team, we believe that current problems around the globe can be solved through critical thinking and cooperation among the next generation of skilled challengers. The first Math Challenge was organized in 2012 as an inter-school competition among international schools in Bangkok with the participation of 144 students from 10 schools. Gradually the number of participants increased and in 2014 Math Challenge went beyond the Thailand borders and started hosting international participants. IMC IX witnessed the participation of 800 students from 20 countries in 2020.

In 2020, aiming to encourage students to study and excel in math and critical thinking, the IMC team decided to conduct an online version of the International Math Challenge to boost the motivation of both teachers and students who have been bored, lost goal-oriented character, and stimulus for study under the difficult global pandemic times, when most of the Olympiads and competitions are forced to be canceled or postponed until unknown time. The IMC team also hoped this competition will help all types of schools to keep their students engaged and to observe their mathematics education in an international arena. The Online IMC 2020 witnessed the participation of 2000 students from 70 countries.

The next year, in 2021, the IMC Team cooperated with many institutions as well as universities from the different regions of the world. The competition was held in 5 languages and was participated in by more than 5000 students from 96 countries. The organizers and five university partners awarded 212 students from Category 4 with a total of more than 15 million USD as a scholarship.

Now, the IMC is the leading math competition in the world by the participating countries. The IMC 2022 will be even far-reaching with more surprises. This event is hoped to motivate students to see math in a different light, have their interest stimulated in the subject, and think about how they can apply math in their future studies and daily life.

We wish the best to all students and their mathematics mentors/trainers. We hope our youth will be inspired to think critically and scientifically by the love of mathematics and technology. We look forward to welcoming you all to the next competition days.

Warm Regards,

Chayanin Mhadla
General Secretary

Competition details:

The Online International Math Challenge is open to all students from all grades. Students can participate under their relevant categories.

Category	US/Canada System	Thai System	British System	Russian System
Category kids	Grade 1	Prathom 1	Year 2	Grade 1
	Grade 2	Prathom 2	Year 3	Grade 2
Category 1	Grade 3	Prathom 3	Year 4	Grade 3
	Grade 4	Prathom 4	Year 5	Grade 4
Category 2	Grade 5	Prathom 5	Year 6	Grade 5
	Grade 6	Prathom 6	Year 7	Grade 6
Category 3	Grade 7	Matthayom 1	Year 8	Grade 7
	Grade 8	Matthayom 2	Year 9	Grade 8
Category 4	Grade 9	Matthayom 3	Year 10	Grade 9
	Grade 10	Matthayom 4	Year 11	Grade 10
Category 5	Grade 11	Matthayom 5	Year 12	Grade 11
	Grade 12	Matthayom 6	Year 13	Grade 12

Dates:

Registration dates: 15 August - 30 October 2022

Competition date: 11-12 November 2022

Results Announcement: 15 November 2022

Awarding Ceremony: 30 November 2022

Exam rules:

The exam will be online in English, Thai, Chinese, Russian, and Spanish.

There will be 25 multiple choice questions for category kids, and 40 questions for all other categories.

3 wrong answers will void 1 correct answer.

Students will be receiving individual awards.

Certificates will be issued to all participants, mentors, and schools.

More information at <https://mathchallenge.in.th/online/>

For any questions, please contact register@mathchallenge.in.th

Topics:

Please see the updated topics at <https://mathchallenge.in.th/online/>

Category 1 Topics

Kindly note that this is the topics for the Online IMC 2021. For the updated topics, please visit our website.

Operations and Properties	Estimating with whole numbers; divide multi-digit whole numbers, order of operations
Introduction to Algebra	Variables and expressions, first degree equations and their solutions
Fractions and Decimals	Operations in fractions and decimals, mixed numbers, solving fraction and decimal equations, comparing and ordering fractions
Number Theory	Factors
Data Collection and Analysis	Mean, median, mode and range, variation, frequency, tables, histograms, box-and-whisker plots
Ratio	Ratio
Measurement and Geometry	Area of rectangles, parallelograms, triangles and trapezoids
Mental Math and Brain Teasers	Age/level appropriate analytical and critical thinking questions



1. Calculate: $36 \times 11 + 24 \times 11 - 20 \times 11$.

A) 440

B) 520

C) 760

D) 880

2. Trees are planted equally on the two side of Walk Street. The distance between the two trees is 4 meters. If Walk Street is 300 m long. How many trees are along the street?

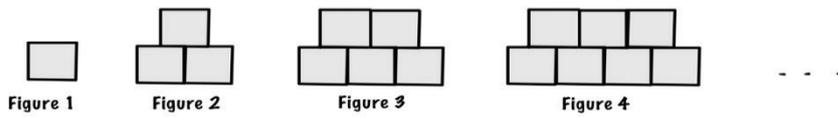
A) 75

B) 76

C) 150

D) 152

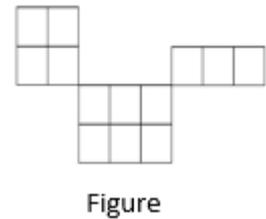
3. The pattern is given in the diagram below, if the pattern is continuing infinitely, how many squares does figure 11 has?



- A) 19 B) 21 C) 23 D) 25

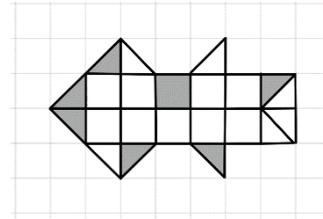
4. If the one side of square is x cm where x is 1-digit integer number. Find the highest value of the sum of the perimeter of the figure below.

- A) 208 B) 214 C) 234 D) 248



5. What fraction is shaded area of shape?

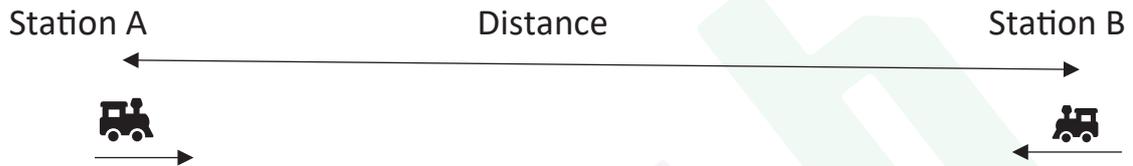
- A) 25% B) 50% C) 60% D) 20%



6. $9A7B$ is a 4-digit number that is divisible by 10. Find the highest value of $A+B$.

- A) 7 B) 9 C) 12 D) 15

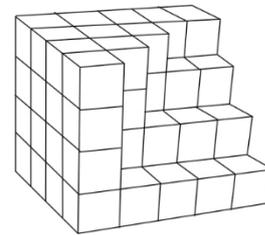
7. A train leaves from the station A with 280 km/h. After 2 hours, another train leaves from the station B with 300 km/h in the opposite direction. They meet each other in 3 hours after the first train leaving. What is the total distance between the two stations?



- A) 580 km B) 840 km C) 1040 km D) 1140 km

8. How many cubes are missing on the figure?

- A) 9 B) 12 C) 20 D) 24



9. 4 students planted 12 flowers in 10 minutes. If 16 students plant together, how many minutes will they finish for 24 flowers?

A) 3

B) 5

C) 8

D) 10

10. George's father is 6 times older than George and George is twice as old as his sister Alice. In 5 years time, the sum of their ages will be 60. How old is George now?

A) 3

B) 6

C) 9

D) 12

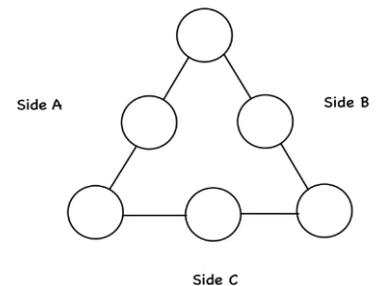
11. A bakery shop sells bread during the week. The owner keeps the selling records for each day. Use this information in the table below to find the mean.

- A) 75 B) 65 C) 60 D) 55

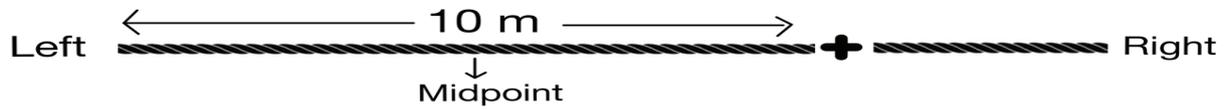
Selling Records	
Days	Frequency
Monday	57
Tuesday	48
Wednesday	50
Thursday	60
Friday	45
Saturday	70
Sunday	90

12. The numbers 1, 2, 3, 4, 5 and 6 are placed for each circle in the diagram. The sum of the numbers for each side is 9. What is the highest number at the top of the diagram?

- A) 3 B) 4 C) 5 D) 6



13. A rope of 10 meters long is given. Another rope is added as much as $\frac{3}{5}$ of the first rope. Where does the new midpoint slide?



- A) 1 m to left B) 1m to right. C) 3m to left. D) 3m to right.

14. Each icon represents different operation signs in the diagram.

When $x = 9$, $y = 6$ and $z = 3$, find the value of expression

$$[(18 \otimes x) \oplus (y @ 4)] + z.$$

- A) 9 B) 18 C) 27 D) 57

Diagram	
$9 \otimes 4 = 36$	
$63 \oplus 9 = 7$	
$4 @ 3 = 1$	
$12 \otimes 8 = 20$	

15. Julia read a book in 20 days. She read 8 pages every day for the first 10 days. Julia has read 1 page more each day than the previous day for the last 10 days. What is the total page of the book?

A) 180

B) 198

C) 215

D) 236

16. Richard is saving money for a new book. On the first day, he put \$1.00 into the moneybox. On the second day, he added \$2.00 more than the first day. On the third day, he added \$2.00 more than the on the second day. If he continues adding \$2.00 more than the previous day, how much will he put to his moneybox on the tenth day?

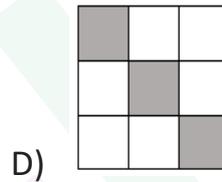
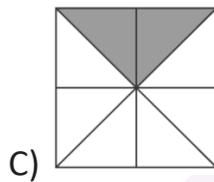
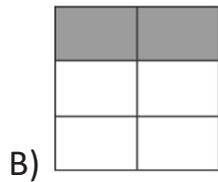
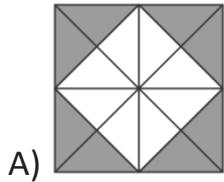
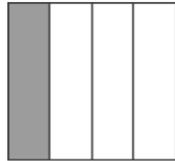
A) \$13

B) \$15

C) \$17

D) \$19

17. Look at the picture below. Which one of the following shows the same fraction shaded?



18. Find the sum of all the even numbers between 45 and 54.

A) 196

B) 250

C) 144

D) 150

19. The smallest 5 digit number that can be formed by using digits 6, 7, 3, 5, 8 is _____.

A) 67368

B) 35876

C) 53678

D) 35678

20. The difference between the smallest 7 digit number and the largest 5 digit number is _____.

A) 9000001

B) 900001

C) 90001

D) 9001

21. In all, there are _____ 5-digit whole numbers in the number system.

A) 90000

B) 9000

C) 900000

D) 900

22. The sum of two numbers is 3174. If one of the numbers is twice the other number, what is the difference between those numbers?

A) 1058

B) 2116

C) 1174

D) 2174

23. Jane ordered 2 pizzas, 2 burgers, 4 sodas, and 5 boxes of fries. If the cost of one pizza, one burger, one soda and one box of fries is \$10, \$21, \$14, and \$16 respectively, then what is the total amount Jane paid?

A) 981

B) 819

C) 189

D) 198

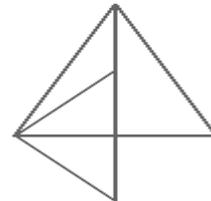
24. How many triangles are there in the given figure?

A) 9

B) 6

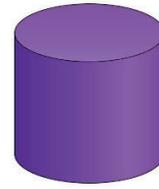
C) 7

D) 8



25. A cylinder has ____ edges.

- A) 0 B) 1 C) 2 D) 3



26. A teacher gave a rectangular coloring sheet to each of his students. The sheet is 15 cm long and 8 cm wide. The area and perimeter of the sheet is ____cm² and ____cm respectively.

- A) 110 cm² , 26 cm B) 120 cm² , 66 cm
C) 120 cm² , 46 cm D) 110 cm² , 46 cm



27. What is the half of $3^3 + 3^3 + 3^3 + 3^3 + 3^3 + 3^3$?

A) 27

B) 54

C) 81

D) 162

28. What is the question mark (?) in the below table?

A) 

B) 

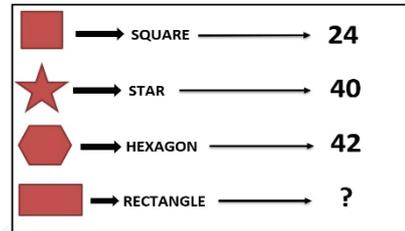
C) 

D) 

29. Which number should come in place of the question mark?

- A) 80 B) 48 C) 36 D) 20



30. One ice cream is given free for children who bring four Popsicle sticks. How many free ice creams does a child get after buying 24 ice creams from the market?

- A) 8 B) 7 C) 6 D) 5

31. How many's  are equal to  ?

- A) 2 B) 4 C) 6 D) 8

$$\heartsuit + \heartsuit = \text{musical note}$$

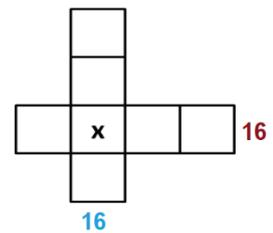
$$\text{musical note} + \heartsuit = \text{star}$$

$$\text{guitar} = \heartsuit + \text{musical note} + \text{star}$$

32. The numbers 1, 2, 3, 4, 5, 6 and 9 are placed to each square, in this diagram.

Sum of the four numbers in the horizontal row and vertical column both are 16 as shown in the picture. Find the value of x ?

- A) 2 B) 4 C) 6 D) 5



33. The word **Mathchallenge** is written repetitively like this:

MathchallengeMathchallengeMathchallenge... . What is the 1000th letter?

A) m

B) e

C) n

D) g

34.

$$\begin{array}{l} \star + \star + \star = 21 \\ \blacktriangle + \blacktriangle + \star = 23 \\ \blacksquare + \blacktriangle + \blacksquare = 26 \\ \blacktriangle + \star + \blacksquare = ? \end{array}$$

A) 23

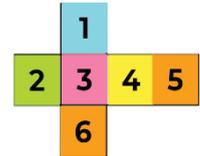
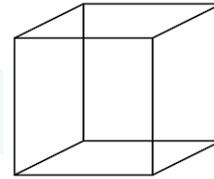
B) 26

C) 25

D) 24

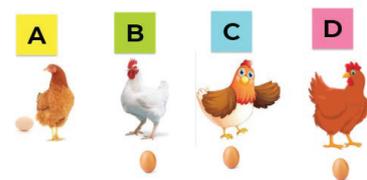
35. Benny opens the box and sticks colorful numbers to all faces as shown below. Later she folds the net back in a way that all the numbers remain outside the box. Which three numbers at the bottom have a common corner?

- A) 1, 2, 4 B) 2, 4, 6 C) 1, 3, 5 D) 1, 2, 5



36. Billy has four chickens labeled as A, B, C, D. A lays an egg every day, B lays an egg once every two days, C lays an egg once every three days, D lays an egg once every four days. If he needs to fill a box of 50 eggs to sell, how many days does he need to fill the box?

- A) 20 B) 24 C) 28 D) 32



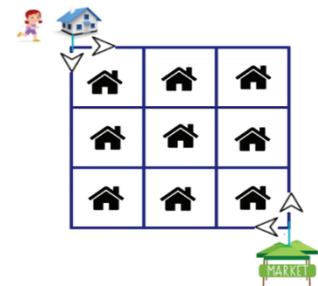
37. Jane decides to play a kind of FLAME game to choose her favorite letter. The rule is starting from letter A, she will cross every 4th letter. If she continues the crossing until only one letter will remain on the circle, what will be the last letter?

- A) U B) V C) X D) Y



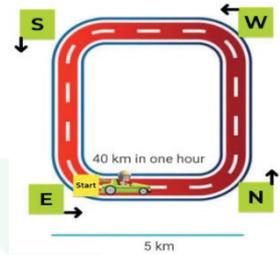
38. Kate has a 4×4 road grid between her home and market. The 1st day she decides to use a different route for each time she goes to market until she finishes all different ways. Considering she goes to market every day, on which day she must use an old route? (She always moves forward)

- A) 18 B) 19 C) 20 D) 21



39. Jack drives a car 40 kilometers each hour around a square shaped road. If he started from the start sign and travelled 3 hours, what would be his direction when he stopped his car?

- A) W B) N C) E D) S



40. Calculate the total mass of rabbit, monkey and the cat.

- A) 34 B) 35 C) 36 D) 37



Answers:

1. A) 440 2. D) 152 3. B) 21 4. C) 234 5. A) 25% 6. B) 9 7. D) 1140 km 8. C) 20
9. B) 5 10. B) 6 11. C) 60 12. A) 3 13. D) 3 m to right 14. B) 18 15. C) 215
16. D) \$19 17. C)  18. A) 196 19. D) 35678 20. B) 900001 21. A) 90000
22. A) 1058 23. D) 198 24. D) 8 25. C) 2 26. C) 120 cm², 46 cm 27. C) 81
28. A)  29. C) 36 30. C) 6 31. C) 6 32. A) 2 33. D) g 34. D) 24 35. D) 1, 2, 5
36. B) 24 37. A) U 38. D) 21 39. C) E 40. D) 37



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Math **Challenge**

Only challengers can make a change!

International Math Challenge

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