

A white scalloped-edged badge with a wavy border, centered on a teal background. The text 'PIMC' is written in a black, sans-serif font inside the badge.

PIMC

2017 TEAM FINALS

I. What is the greatest common factor of 96 and 180?

ANSWER

12

2. Express the following as a common fraction

$$1 + \frac{1}{1 + \frac{1}{1 + 2}}$$

ANSWER

$$7/4$$

3. When all the medians of a triangle are drawn, 6 small triangles with equal areas are formed. Let the medians of a triangle ABC meet at G . If the area of ABC is 150, what is the area of the quadrilateral $ABGC$?

ANSWER

100

4. What is the units digit of 9^{2017} ?

ANSWER

9

5. The angles of a quadrilateral form an arithmetic sequence. The smallest angle is 60 degrees. What is the largest angle, in degrees?

ANSWER

120

6. What common fraction is equidistant from $\frac{1}{2}$ and $\frac{1}{3}$ on the number line?

ANSWER

5/12

7. How many positive factors of
100 are even?

ANSWER

6

8. Two dice are rolled. What is the probability that the two numbers shown are different? Express your answer as a common fraction.

ANSWER

5/6

9. What is the sum of the smallest 5 odd prime numbers?

ANSWER

39

10. Jose is biking at 20 miles per hour. At this rate, how many miles will he travel in 48 minutes?

ANSWER

16

11. The sum of two integers is 660. One of the numbers is three times the other. What is the larger integer?

ANSWER

495

12. Which perfect square is
closest to 600?

ANSWER

576

13. In a triangle ABC , M is the midpoint of AC . If $AM = BM = CM$ and $\angle BAC = 10$, what is $\angle ABC$?

ANSWER

90

14. What are the last two digits of

$$5^{4^3 2^1 0} ?$$

ANSWER

25

15. In a park there are 2 more bicycles than tricycles. If altogether, there are 64 wheels, how many bicycles are there in the park?

ANSWER

14

16. What is

$$95 + 97 + 99 + 101 + 103 + 105 + 107?$$

ANSWER

707

17. What is the positive difference
between

$$21 + 22 + \cdots + 40$$

and

$$1 + 2 + \cdots + 20?$$

ANSWER

400

18. When students line up for lunch, Alice becomes the 40th student from the front and also 40th student from the end of the line. How many students are in line?

ANSWER

79

19. The numerical value of the area of a square is twice its perimeter. What is the side length of the square?

ANSWER

8

20. In how many ways can Andrew, Bob, Cindy, and Diana sit on a bench so that the two boys are together and the two girls are together?

ANSWER

8

21. Al and Bert update their social media accounts every 6 and 9 hours, respectively. This week they updated their social media accounts at the same time on Monday at 5am. How many times this week do they both updates their social media accounts at the same time?

ANSWER

10

22. What is the average of
2.468 and 8.642?

Express your answer as a
decimal to the nearest
thousandth.

ANSWER

5.555

23. What is x if

$$2^{2^{2^2}} = (x^x)^2?$$

ANSWER

4

24. A book costs \$150 on Monday. On Tuesday its price is reduced by 20%. On Wednesday its price is reduced by another 20%. What is the price of the book, in dollars, after the second discount?

ANSWER

96

25. A triangle with base length twice its height has area 100. If you triple the base and halve the height, what is the area of the new triangle?

ANSWER

150

26. In triangle ABC , $\angle BAC = 90^\circ$. Points P and Q are chosen on the plane such that PAB and QAC are equilateral and the interiors of PAB and QAC does not intersect with the interior of ABC . What is $\angle PAQ$, in degrees

ANSWER

150

27. A coin is flipped three times.
What is the probability of getting
the same face in all three flips?

Express your answer as a
common fraction.

ANSWER

1/4

28. The perimeter of a triangle is 20. What is the smallest positive integer that cannot be a side length of this triangle?

ANSWER

10

29.

What is $53^2 - 3^2$?

ANSWER

2800

30.

Ben's age is twice Adam's age.

Cindy's age is three times Adam's age. The sum of the three ages is 54. How old is

Ben?

ANSWER

18

31. What is the value of the
expression

$$\sqrt{2} \times \sqrt{20} \times \sqrt{250} ?$$

ANSWER

100

32. If A is a positive integer and A^2 is 8464, what is the value of A ?

ANSWER

92

33. A rectangle has perimeter 34 and area 60. What is the length of the diagonal?

ANSWER

13

34. What is

$$19 \times 21 - 18 \times 22?$$

ANSWER

3

35. If p and $p^2 + 3$ are prime numbers, what is $p^3 - 1$?

ANSWER

7

36. How many positive two-digit integers are divisible by 5 but not 4?

ANSWER

14

37. Alex, Bob, and Cindy races in a marathon. If there are no ties and Cindy finishes ahead of Bob, how many rankings of the three are possible?

ANSWER

3

38. What is the sum of the different prime divisors of $20! = 1 \times 2 \times \dots \times 20$?

ANSWER

77

39. 10th Annual PiMC would be held in 2024. How many total days are there in the years 2015 through 2024?

ANSWER

3653

40. Kristen selects two primes that are both larger than 3 and multiplies them. The product is in the 80's. What is the larger prime?

ANSWER

17