Round I: Purely Objective, 60 Marks, 2 Hours

Section I - True or False - 10 Questions, 10 Marks (1 Mark Each)

Section II - MCQs - 10 Questions, 20 Marks (2 Marks Each)

Section III - Two-Digit Answers Only - 10 Questions, 30 Marks (3 Marks Each)

Section I : Each question carries 1 mark

विभाग I : प्रत्येक प्रश्नाला 1 गुण आहे

For Q.1 to 10: State whether TRUE or FALSE.
Select the box labelled T if the statement is TRUE.
Select the box labelled F if the statement is FALSE.

प्रश्न क्रमांक **1** ते **10:** चूक की बरोबर ते ओळखा.
दिलेले वाक्य जर बरोबर असेल तर **T** लिहिलेला बॉक्स निवडा.
दिलेले वाक्य जर चुकीचे असेल तर **F** लिहिलेला बॉक्स निवडा.

1. There exists a 3-digit number that is both a perfect square and has the property that the sum of its digits is 12.

   एक अशी तीन अंकी पूर्ण वर्ग संख्या अस्तित्वात आहे, जिच्या अंकांची बेरीज 12 आहे.

   Answer: **False**

   Solution: The given sum of the digits of the number is divisible by 3 – hence the number too is divisible by 3. Since the number is also a perfect square, it must be divisible by 9. Hence, the sum of its digits should be divisible by 9, which is not the case.

2. The result of adding the squares of the first five positive integers is 55.

   पहिल्या पाच क्रमवार धन पूर्णांकांच्या वर्गांची बेरीज 55 आहे.

   Answer: **True**

   Solution: $1^2 + 2^2 + 3^2 + 4^2 + 5^2 = 1 + 4 + 9 + 16 + 25 = 55$

3. The 100th term of the sequence

$(1 - (\frac{4}{1}))$, $(1 - (\frac{4}{9}))$, $(1 - (\frac{4}{25}))$, $(1 - (\frac{4}{49}))$, $(1 - (\frac{4}{81}))$, …

is $(1 - (\frac{4}{x^2}))$, where x = 199.

$(1 - (\frac{4}{1}))$, $(1 - (\frac{4}{9}))$, $(1 - (\frac{4}{25}))$, $(1 - (\frac{4}{49}))$, $(1 - (\frac{4}{81}))$, …

वरील अंक क्रमिकेतील 100 वे पद x = 199 हया मूल्यासाठी $(1 - (\frac{4}{x^2}))$ हे आहे.

Answer: **True**

Solution: The given sequence is (1 − 4/1),(1 − 4/9),(1 − 4/25),(1 − 4/49),(1 − 4/81), …
General term = 1 − (4/(2n − 1)²)
For the 100th term, n = 100
So we get, 100th term = 1 – (4/(200 − 1)²) = 1 – (4/199²), where x = 199.

4. Subtracting the polynomial $(5x^2 - 7)$ from $(8x^3 + 7x^2 + 8)$ results in $(8x^3 + 2x^2 - 1)$.

$(8x^3 + 7x^2 + 8)$ हया बहुपदीमधून $(5x^2 - 7)$ वजा केल्यास $(8x^3 + 2x^2 - 1)$ ही बहुपदी मिळते.

Answer: **False**

Solution: $(8x^3 + 7x^2 + 8) - (5x^2 - 7) = 8x^3 + 7x^2 + 8 - 5x^2 + 7 = 8x^3 + 2x^2 + 15$

5. The decimal representation of the fraction $\frac{3}{7^3}$ will never end, and its digits will not repeat in a pattern.

$\frac{3}{7^3}$ चे दशांश रूप कधीच संपणार नाही आणि त्यातील अंक कोणत्याही ठराविक पद्धतीने पुन्हा पुन्हा येणार नाहीत.

Answer: **False**

Solution: It is a rational number in the p / q form, where p and q are both integers and q is not 0. Also, the denominator is divisible by 7, which is different from 2 and 5.
So, it will be a non-terminating (never-ending) but recurring (in a pattern) decimal.

6. Joining two 4 cm cubes end-to-end creates a cuboid with a surface area of 160 sq. cm.

दोन 4 सेंटीमीटर बाजूंचे घन एकमेकांना टोकाला जोडल्यास तयार होणाऱ्या इष्टिकाचितीचे पृष्ठफळ 160 चौरस सेंटीमीटर असते.

Answer: **True**

Solution: The cuboid will have 6 faces. The dimensions will be l = 8, b = 4, h = 4.
So, total surface area = 2 (lb + bh + lh) = 2 (32 + 16 + 32) = 2 (80) = 160 cm^2.

7. The angle between the bisectors of two adjacent angles α and β is 90°, provided that α + β = 180°.

α आणि β या दोन लगतच्या कोनांच्या दुभाजकांमधील कोन 90° असतो, जर α + β = 180° असेल.

Answer: **True**

Solution: The angle between the bisectors is ½ (α + β) = ½ (180°) = 90°

8. Consider eight people standing on the vertices of a regular octagon.
Then, the number of handshakes possible, given the restriction that opposite persons do not shake hands, is always 24.

एका नियमित अष्टकोनाच्या शिरोबिंदूंवर आठ लोक उभे आहेत असे समजा.
अट अशी आहे की, विरुद्ध शिरोबिंदूंवर उभ्या असणाऱ्या व्यक्तींनी एकमेकांशी हस्तांदोलन करू नये.
तर या अटीनुसार, शक्य होणाऱ्या हस्तांदोलनांची एकूण संख्या कायम 24 इतकी असेल.

Answer: **True**

Solution: The total number of handshakes possible among n people, with no restrictions, is the number of ways to choose 2 people from n = 8 people.
Hence, total handshakes = 28
In a regular octagon with 8 vertices, there are 4 pairs of opposite vertices.
These four pairs represent the handshakes that are not allowed.
(e.g., if the vertices are labelled 1 through 8, the excluded pairs are (1, 5), (2, 6), (3, 7), and (4, 8)).
Possible Handshakes = Total Handshakes − Handshakes to Exclude = 28 − 4 = 24

9. The perimeter of a rectangle does not change when its length is multiplied by two and its width is divided by two.

आयताच्या लांबीला दोनने गुणले आणि रुंदीला दोनने भागले तर त्याची परिमिती बदलत नाही.

Answer: **False**

Solution: Let P = 2 (l + b) and P' = 2 (2l + b/2) = 4l + b. Clearly, P ≠ P'.

10. There exists a natural number n for which the equation $5^{\sqrt{n}} + 12^{\sqrt{n}} = 13^{\sqrt{n}}$ holds true.

एक अशी नैसर्गिक संख्या n अस्तित्वात आहे, ज्यासाठी $5^{\sqrt{n}} + 12^{\sqrt{n}} = 13^{\sqrt{n}}$ हे समीकरण खरे आहे.

Answer: **True**

Solution: Put n = 4.

Then, $5^{\sqrt{4}} + 12^{\sqrt{4}} = 5^2 + 12^2 = 25 + 144 = 169 = 13^2 = 13^{\sqrt{4}}$

Section II : Each question carries 2 marks

विभाग II : प्रत्येक प्रश्नाला 2 गुण आहेत

For Q.11 to 20: Choose the correct option.
प्रश्न क्रमांक **11** ते **20:** योग्य पर्याय निवडा.

11. A cafe offers three saucer choices, two cup choices and two spoon choices to serve coffee. If each serving combination must include one of each item, determine the total number of distinct combinations possible.

एका कॉफी शॉप मध्ये कॉफी देण्यासाठी तीन बशीचे पर्याय, दोन कपाचे पर्याय आणि दोन चमच्याचे पर्याय उपलब्ध आहेत. जर अशी एक गट रचना तयार करण्यासाठी वरील पैकी प्रत्येक वस्तूचा एक - एक पर्याय आवश्यक असेल, तर ग्राहकांना कॉफी देण्यासाठी तुम्ही तयार करू शकणाऱ्या विविध गट रचनांची एकूण संख्या शोधा.

a. 9 b. 24 c. 20 d. 12

Answer: **d. 12**

Solution: Total no. of distinct combinations = 3 x 2 x 2

12. $3 + \frac{1}{3+\frac{1}{3+\frac{1}{3}}}$ = ...

a. $\frac{31}{10}$ b. $\frac{49}{15}$ c. $\frac{33}{10}$ d. $\frac{109}{33}$

Answer: **d.** $\frac{109}{33}$

Solution:
Start with the innermost denominator.
Step I:
$3 + \frac{1}{3} = \frac{10}{3}$
Step II:
$\frac{1}{\frac{10}{3}} = \frac{3}{10}$
Step III:

$3 + \frac{3}{10} = \frac{33}{10}$

Step IV:

$\frac{1}{\frac{33}{10}} = \frac{10}{33}$

Step V:

$3 + \frac{10}{33} = \frac{109}{33}$

13. A class survey found that one-fifth of the students like cricket, and one-third prefer football. The number of students who enjoy badminton is three times the difference between the numbers of cricket and football fans. Additionally, one student in the class doesn't like any of these three sports, choosing reading instead.
Then, find the total number of students interested in cricket.

एका वर्गाच्या सर्वेक्षणात असे आढळून आले की एक पंचमांश विद्यार्थ्यांना क्रिकेट आवडते आणि एक तृतीयांश विद्यार्थ्यांना फुटबॉल आवडते. बॅडमिंटन आवडणाऱ्या विद्यार्थ्यांची संख्या क्रिकेट आणि फुटबॉल चाहत्यांच्या संख्येतील फरकाच्या तिप्पट आहे. वर्गातील एका विद्यार्थ्याला या तिन्ही खेळांपैकी कोणताही खेळ आवडत नाही, त्याऐवजी तो वाचन निवडतो.
तर, क्रिकेटमध्ये रस असलेल्या एकूण विद्यार्थ्यांची संख्या शोधा.

a. 15 b. 5 c. 3 d. 6

Answer: **c. 3**

Solution: Let the total number of students be N.

Number of students who like cricket = N/5

Number of students who prefer football = N/3

The absolute difference =|N/5 - N/3|= |(3N - 5N)/15|= 2N/15

Number of students who like badminton = 3 × difference = 3 x 2N/15 = 2N/5

One student does not like any of these sports (likes reading instead), so add 1.

Final equation: N/5 + N/3 + 2N/5 + 1 = N

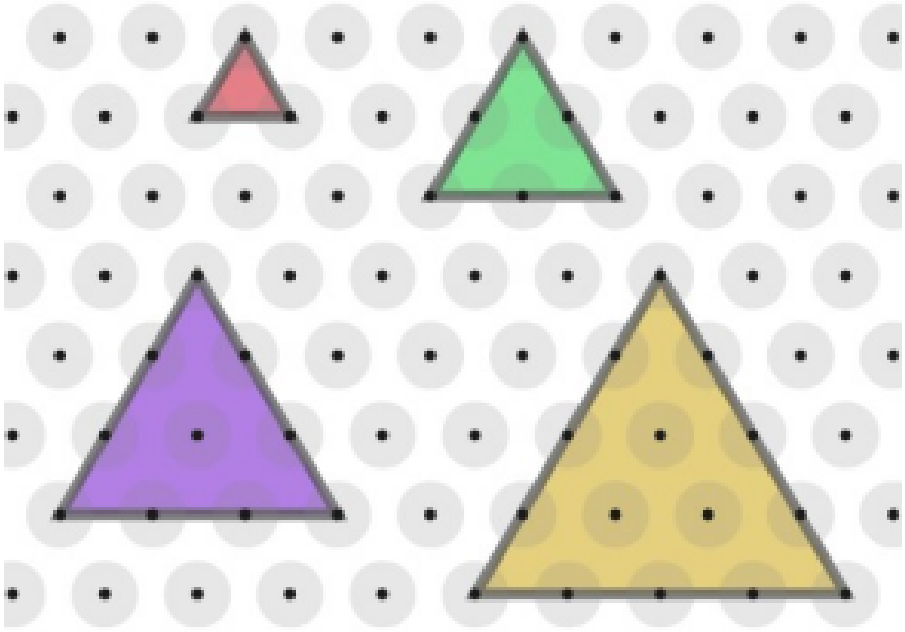
So, 14N/15 + 1 = N

14N + 15 = 15N ⇒ N = 15

Hence, the number of students who like cricket = N/5 = 15/5 = 3

14. Consider the accompanying image featuring a collection of equilateral triangles. Assuming the area of the smallest triangle is 1 square unit, calculate the respective areas for the green (G), purple (P), and yellow (Y) triangles.
(Answers are given in square units).

शेजारील आकृतीत काही समभुज त्रिकोण दर्शविले आहेत. जर सर्वात लहान त्रिकोणाचे क्षेत्रफळ १ चौरस एकक असेल, तर हिरव्या (G), जांभळ्या (P) आणि पिवळ्या (Y) त्रिकोणांचे क्षेत्रफळ अनुक्रमे किती असेल? (सर्व उत्तरे चौरस एककांमध्ये दिली आहेत).



a. G - 3, P - 9, Y - 10

b. G - 4, P - 9, Y - 16

c. G - 3, P - 6, Y - 15

d. G - 4, P - 9, Y - 12

Answer: b. G - 4, P - 9, Y - 16

Solution:

Since all the triangles are equilateral and are drawn on an isometric dot grid (a grid made of equilateral triangles), they are all similar. The ratio of the areas of two similar figures are equal to the square of the ratio of their corresponding side lengths. In this grid, the side length of any equilateral triangle can be measured by the number of

units (the shortest distance between adjacent dots).
Let sR be the side length of the smallest (red) triangle, and AR be its area.
We are given that AR = 1 square unit.

Triangle	Side Length (s)	Ratio of Sides (s/sR)	Area (A = 1 × (Ratio)^2)
Red (R)	1 unit	1	1
Green (G)	2 units	2	1 × 2^2=4
Purple (P)	3 units	3	1 × 3^2=9
Yellow (Y)	4 units	4	1 × 4^2=16

15. If the fourth power of 27 is 531441, what is the square root of 53.1441?

जर 27 च्या चौथ्या घाताची किंमत 531441 असेल, तर 53.1441 या संख्येचे वर्गमूळ किती असेल?

a. 2.7 b. 72.9 c. 7.029 d. 7.29

Answer: d. 7.29

Solution: $27^4 = 3^{12} = (3^6)^2 = 531441$
So, the square root of 531441 = $3^6 = 729$
So, the square root of 53.1441 = 7.29

16. $\frac{\left(243^{\frac{n}{5}}\right)\left(3^{2n+1}\right)}{\left(9^n\right)\left(3^{n+1}\right)}$ = ...

a. 1 b. 3 c. 9 d. 27

Answer: a. 1

Solution:

$$\frac{\left(243^{\frac{n}{5}}\right)\left(3^{2n+1}\right)}{\left(9^n\right)\left(3^{n+1}\right)} = \frac{\left(\left(3^5\right)^{\frac{n}{5}}\right)\left(3^{2n}\right)(3)}{\left(\left(3^2\right)^n\right)\left(3^n\right)(3)} = \frac{\left(3^n\right)\left(3^{2n}\right)}{\left(3^{2n}\right)\left(3^n\right)} = 1$$

17. What should be added to x^2 - 2x - 11 so that the new polynomial is equal to the product of (x + 3) and (x - 5)?

x^2 - 2x - 11 या बहुपदीत किती मिळवले असता येणारी नवीन बहुपदी (x + 3) आणि (x – 5) यांच्या गुणाकाराइतकी असेल?

a. 3 b. -3 c. 4 d. -4

Answer: d. - 4

Solution:
We have (x + 3) (x – 5) = x^2 - 2x - 15.
So, (- 4) should be added to the given polynomial x^2 - 2x - 11 to obtain x^2 - 2x - 15.

18. How many digits does the product 4^9 x 5^8 have?

4^9 x 5^8 ह्या गुणाकाराचे उत्तर ही किती अंकी संख्या आहे?

a. 6 b. 8 c. 10 d. 12

Answer: d. 12

Solution: 4^9 x 5^8 = 2^{18} x 5^8 = 2^{10} x 2^8 x 5^8 = 2^{10} x $(2 \times 5)^8$ = 2^{10} x 10^8

As 2^{10} = 1024, 2^{10} x 10^8 = 102400000000
Hence, there are 12 digits in all.

19. Consider the following algebraic expressions:

I. n (n + 1) + 1 II. n (n + 2) + 1

III. n (n + 1) (n + 2) (n + 3) + 1 IV. n (n + 1) (n + 2) (n + 3) (n + 4) + 1

For which of these expressions is the value always a **perfect square** for each **positive integer** n?

प्रत्येक पूर्णांक संख्या n साठी वरील पैकी कोणत्या बैजिक राशींचे मूल्य हे नेहमीच पूर्ण वर्ग संख्या असेल?

a. Both I and II
I आणि II

b. Only II
फक्त II

c. Both II and III
II आणि III

d. All of them
सर्व राशी

Answer: c. Both II and III

Solution:

I. Put n = 1. Then, n (n + 1) + 1 = 3 — Not a perfect square

II. $n (n + 2) + 1 = n^2 + 2n + 1 = (n + 1)^2$ — Always a perfect square for all n

III. $n (n + 1) (n + 2) (n + 3) + 1$
$= (n^2 + 3n) (n^2 + 3n + 2) + 1$
Let $n^2 + 3n = p$
Then III becomes $p (p + 2) + 1$
$= p^2 + 2p + 1 = (p + 1)^2$ — Always a perfect square for all p, and hence, for all n.

IV. Put n = 2.
Then, n (n + 1) (n + 2) (n + 3) (n + 4) + 1
= (2 x 3 x 4 x 5 x 6) + 1 = 721 — Not a perfect square

20. Vishnu makes a 5% profit by selling a bike for ₹ 10,500.

Determine the percentage profit or loss he would incur if he reduced the selling price to ₹ 9,000.

विष्णूला एक बाईक 10,500 रुपयांना विकल्यामुळे 5% नफा झाला.

जर त्याने विक्री किंमत कमी करून 9000 रुपये केली, तर त्याला होणारा नफा किंवा तोटा किती टक्के असेल?

a. Gain of 1%
1% नफा

b. Loss of 10%
10% तोटा

c. Loss of 15%
15% तोटा

d. No gain, no loss
ना नफा, ना तोटा

Answer: b. Loss of 10%

Solution: Given that SP = ₹ 10500 and P = 5%.

CP	SP
100	105
?	10500

CP = (100 x 10500)/105 = ₹ 10000

Now, new SP = ₹ 9000

As SP < CP, there is loss = 10000 − 9000 = ₹ 1,000

Loss% = (Loss / CP) × 100

= (1000 / 10000) × 100

= 10

Section III : Each question carries 3 marks

विभाग III : प्रत्येक प्रश्नाला 3 गुण आहेत.

For Q.21 to 30: Write the correct two-digit natural number as an answer for each question.

प्रश्न क्रमांक **21** ते **30:** उत्तर म्हणून योग्य दोन अंकी नैसर्गिक संख्या लिहा.

21. A quantity of hay lasts a single horse for 8 weeks. That same amount of hay feeds 3 goats for 12 weeks. How many days will it take 2 horses and 5 goats, working together, to eat all the hay?

एका घोड्याला जेवढे गवत 8 आठवडे पुरते, तेवढेच गवत 3 शेळ्यांना 12 आठवडे पुरते.
तर 2 घोडे आणि 5 शेळ्यांना एकत्रितपणे तेवढेच गवत खाण्यासाठी किती दिवस लागतील?

Answer: **18**

Solution:

The fraction of haystack consumed in 1 week by 1 horse = 1/8.

The fraction of haystack consumed in 1 week by 1 goat = 1/3 × 1/12 = 1/36.

∴ The fraction of the haystack consumed in 1 week by 2 horses and 5 goats together

= 2 × 1/8 + 5 × 1/36 = 1/4 + 5/36 = 14/36 = 7/18.

∴ The fraction of the haystack consumed in 1 day by 2 horses and 5 goats together

= 1/7 × 7/18 = 1/18.

Hence, the haystack will be completely consumed by the 2 horses and 5 goats together in 18 days.

22. A dog weighs 12 kg plus a quarter of its own weight.
If a cat weighs 7/8 of the dog's weight, how much does the cat weigh in kilograms?

एका कुत्र्याचे एकूण वजन त्याच्या स्वतःच्या वजनाच्या एक चतुर्थांशापेक्षा 12 किलोग्रॅमने जास्त आहे.
जर एका मांजरीचे वजन ह्या कुत्र्याच्या वजनाच्या 7/8 असेल, तर मांजरीचे वजन किती किलोग्रॅम असेल?

Answer: **14**

Solution:

Let D be the weight of the dog in kgs.
Given that: D = 12 + D/4
D - D/4 = 12
3D/4 = 12
3D = 48
D = 16
So, the dog weighs 16 kg.

Now, let C be the weight of the cat in kgs.
Given that: C = 7D/8
C = (7 x 16) / 8
C = 7 x 2
C = 14
So, the cat weighs 14 kg.

23. If 49 < n^2 < 169, how many integer values can n take?

जर 49 < n² < 169 असेल, तर n किती पूर्णांक मूल्ये घेऊ शकेल?

Answer: 10

Solution:

Taking the square root, we get: 7 < $|n|$ < 13
So, $|n|$ = 8, 9, 10, 11, 12
That is, n = ±8, ±9, ±10, ±11, ±12
Thus, 5 positive values + 5 negative values = 10 integer values.

24. $\left|\left[\left(-5^2-2^0\times 2\right)^{\frac{1}{3}}\right]\times\left[64^{\frac{1}{3}}\right]\right|$ = ……..

Answer: 12

Solution:

Left bracket = (-27)^1/3 = -3

Right bracket = 64^1/3 = 4

So, -3 x 4 = -12

Finally, its absolute value is 12.

25. How many years are required for a principal amount to reach six times its value at a simple annual interest rate of 12.5%?

एका रकमेची द. सा. द. शे. 12.5 दराने सरळ व्याजाने सहा पट होण्यास किती वर्षे लागतील?

Answer: 40

Solution: Suppose P = 100; then A = 600.
So, I = A – P = 600 – 100 = 500
I = PNR/100
500 = 100 × N × 12.5/100 = N × 12.5
So, N = 500/12.5 = 5000/125 = 40

26. At a major event, 60 total prizes were awarded to men, women, and children.
The total prize money for men, women, and children was in the ratio of 5 : 4 : 3, respectively. However, the value of the individual prizes followed a different ratio:
Man's prize : Woman's prize : Child's prize = 3 : 2 : 1.
How many men won a prize?

एका मोठ्या समारंभात पुरुष, महिला, आणि मुले ह्यांच्यात मिळून एकूण 60 बक्षीसे देण्यात आली.
पुरुष, महिला आणि मुलांसाठीच्या एकूण बक्षीसांच्या रकमेचे गुणोत्तर अनुक्रमे 5 : 4 : 3 असे होते आणि पुरुष, महिला आणि मुलांसाठीच्या वैयक्तिक बक्षीसांच्या रकमेचे गुणोत्तर अनुक्रमे 3 : 2 : 1 असे होते.
तर एकूण किती पुरुषांना बक्षीस मिळाले ती संख्या सांगा.

Answer: 15

Solution:

The number of winners (N) for each group is determined by the total prize money (T) they received divided by the individual prize value (V) of their award:

N = T/V

We are given two ratios:

Total Prize Money Ratio (T) = Men : Women : Children = 5 : 4 : 3
Individual Prize Value Ratio (V) = Men : Women : Children = 3 : 2 : 1

Hence,
Ratio of Winners = (T Men / V Men) : (T Women / V Women) : (T Children / V Children)
= (5/3) : (4/2) : (3/1)
= (5/3) : 2 : 3
= 5 : 6 : 9 After multiplying by 3 throughout
This means for every 5 men, there are 6 women and 9 children who won a prize.

But 5 + 6 + 9 = 20 parts
We know that 60 prizes are given, which is 3 times 20.
Hence, the number of men who won the prize = 5 x 3 = 15

27. Sameera is travelling from Pune to Lonavala to attend a 4-Day Yoga Workshop.
The distance between Pune and Lonavala is 70 km.
Sameera's journey involved two parts:

A. Pune to Lonavala: She drove at an average speed of 35 km/h.
B. Lonavala to Pune: The return journey took her 90 minutes.

What was Sameera's average speed for the entire round trip in km/h?

एका 4 दिवसीय योगासन कार्यशाळेला जाण्यासाठी समीराने पुणे ते लोणावळा हा 70 किमी चा प्रवास केला.
समीराच्या या प्रवासाचे दोन महत्वाचे भाग आहेत, ते खालीलप्रमाणे :

A. पुणे ते लोणावळा प्रवास तिने सरासरी 35 किमी/तास या वेगाने केला.
B. लोणावळा ते पुणे या परतीच्या प्रवासासाठी तिला 90 मिनिटे लागली.

तर, या संपूर्ण येताना व जातानाच्या प्रवासासाठी तिला लागलेला सरासरी वेग (किमी/तास) किती असेल?

Answer: 40

Solution: Average Speed = Total Distance/ Total Time

Total Distance = 2 x 70 = 140 km

Total Time = Pune to Lonavala Time (T) + Lonavala to Pune Time (t)

- T = Distance/ Speed = 70 / 35 = 2 hours
- t = 90 min = 1.5 hours

Total Time = T + t = 3.5 hours

Average Speed = 140 / 3.5 = 40 km/hr

28. In a circular arrangement of ten people, the age of each person is unknown. Each individual states the sum of the ages of their two adjacent neighbours.

The ten sums, in clockwise sequence, are:
20 22 24 26 28 30 32 34 36 38

Determine the age of the person who reported the sum of 26.

दहा मित्र गोल रिंगण करून बसले आहेत. प्रत्येकाचं वय किती आहे, हे कोणालाच माहीत नाही. प्रत्येक जण काय करतो, तर त्याच्या लगतच्या दोन मित्रांच्या वयाची बेरीज सांगतो. घड्याळाच्या काट्याच्या दिशेप्रमाणे (clockwise) बघितले असता, त्या दहा बेरजा अशा आल्या:
20 22 24 26 28 30 32 34 36 38

तर ज्या माणसाच्या शेजाऱ्यांच्या वयाची बेरीज 26 आली, त्याचं स्वतःचं वय किती असेल?

Answer: 18

Solution:

$a_1, a_2, a_3, a_4, \ldots a_{10}$ be the ages of the persons at the positions clockwise.

The age of the person who answered 26 is a_4.

Sum of the answers given by the persons sitting at odd positions are

$(a_{10} + a_2) + (a_2 + a_4) + (a_4 + a_6) + (a_6 + a_8) + (a_8 + a_{10}) = 2(a_2 + a_4 + a_6 + a_8 + a_{10})$

$= 20 + 24 + 28 + 32 + 36$

$= 140$

So, $(a_2 + a_4 + a_6 + a_8 + a_{10}) = 70$

Hence, $a_4 = 70 - ((a_{10} + a_2) + (a_6 + a_8)) = 70 - 20 - 32 = 18$

29. If p, q and r are distinct prime numbers such that $p < 20$, $q < 20$ and $r < 20$, satisfying the relation $p^2 + q^2 = r^3$, then what is the largest possible value of $(p + q + r)$?

जर p, q आणि r या अशा विभिन्न अविभाज्य संख्या आहेत की $p < 20$, $q < 20$ आणि $r < 20$, आणि त्यांच्यातील संबंध $p^2 + q^2 = r^3$ असा असेल, तर $(p + q + r)$ ची सर्वात मोठी संभाव्य किंमत किती असेल?

Answer: **18**

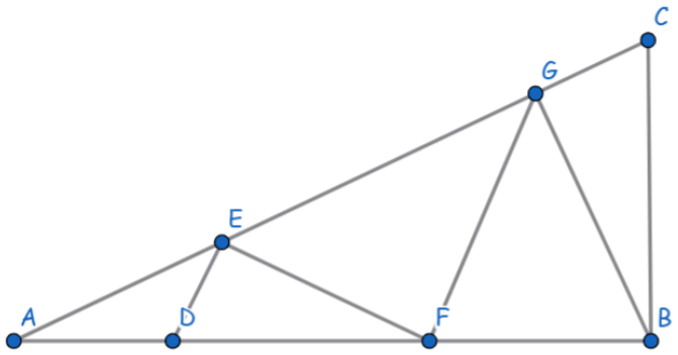
Solution: Consider $p = 2$, $q = 2$, $r = 2$. As $r > 2$, r is an odd prime.
So, one prime among p and q is 2.
Then, $p + q + r$ is maximum if $p = 2$, $q = 11$, $r = 5$.
So, the answer is 18.

30. In the following figure, find the measure $\angle BGC$ in degrees if:

- $\angle BAC = 20^\circ$, $\angle AED = 50^\circ$ and $\angle CBF = 90^\circ$
- Segments DE and FG are parallel to each other.
- Segments EF, FG and BG are equal to each other.

दिलेल्या आकृतीमध्ये $\angle BGC$ चे माप किती अंश आहे हे शोधा, जर:

- $\angle BAC = 20^\circ$, $\angle AED = 50^\circ$, and $\angle CBF = 90^\circ$
- रेषाखंड DE आणि FG हे एकमेकांना समांतर आहेत.
- रेषाखंड EF, FG आणि BG हे समान लांबीचे आहेत.



Answer: **90**