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Intermediate International Vedic Maths Olympiad 2022
Time allowed - 1 Hour

Questions 1 - 25 each carry 2 marks

1. $10.01 - 1.1$

   A 8.91   **B** 9.01   **C** 9.1   **D** 9.9   **E** 9.91

2. Which of the following is **not** divisible by 9?

   A 277227722772   **B** 1234545678   **C** 432234432234   **D** 90817263542   **E** 623637613683

3. When using Vertically and crosswise to calculate 367×482, what is the result of the third step before any carry digits are included?

   A 76   **B** 80   **C** 82   **D** 87   **E** 92

4. Given that $3 \times 37 = 111$, calculate $999999 \div 37$.

   A 54054   **B** 45045   **C** 36036   **D** 27027   **E** 18018

5. What is the square root of 5625?

   A 45   **B** 55   **C** 65   **D** 75   **E** 85

6. One of the following shows the correct working for 329×989 using Nikhilam multiplication. Which one?

   A
   $$329 - 6\ 7\ 1$$
   $$\times\ 989 - 0\ 0\ 1$$
   $$325\ /\ _7 3\ _7 8\ _1 1$$

   B
   $$329 - 6\ 7\ 1$$
   $$\times\ 989 - 1\ 1\ 1$$
   $$325\ /\ _7 3\ _7 8\ _1 1$$

   C
   $$329 - 6\ 7\ 1$$
   $$\times\ 989 - 0\ 1\ 1$$
   $$325\ /\ _7 3\ _7 8\ _1 1$$

   D
   $$329 - 6\ 7\ 1$$
   $$\times\ 989 - 0\ 1\ 1$$
   $$325\ /\ _6 3\ _7 8\ _1 1$$

   E
   $$329 - 6\ 7\ 0$$
   $$\times\ 989 - 0\ 1\ 1$$
   $$325\ /\ _7 3\ _7 8\ _1 1$$

7. The devinculated form of $6\bar{2}$ is 58. What is the devinculated form of $7\bar{3}2\overline{1}40\bar{3}$?

   A 6718597   **B** 6728607   **C** 6619697   **D** 6718607   **E** 6718507

8. 83% of $25.00

   A $20.75   **B** $20.50   **C** $20.15   **D** $19.75   **E** $19.35

9. Using Nikhilam division for 24219 ÷ 897, some workings are shown below. What are the three missing digits for A, B and C?

$$
\begin{array}{c|c}
897 & 2\ 4\ /\ 2\ 1\ 9 \\
& A\ \ B\ C \\
& 6\ 1\ 8 \\
\hline
& 2\ 7\ /\ 0\ 0\ 0
\end{array}
$$

     A 328   **B** 283   **C** 206   **D** 308   **E** 204

10. 0.000125^2

     A 0.000625   **B** 0.00015625   **C** 0.00000015625   **D** 0.000000015625   **E** 0.000000000625

11. What are the final three digits of the answer to 9999997^2 ?

     A 009   **B** 049   **C** 014   **D** 019   **E** 409

12. Which fraction is the largest?

     A $\dfrac{24}{2972}$ **B** $\dfrac{12}{1483}$ **C** $\dfrac{6}{745}$ **D** $\dfrac{3}{373}$ **E** $\dfrac{1}{124}$

13. What is the whole number remainder for $57499 \div 312$?

     A 61   **B** 81   **C** 82   **D** 91   **E** 92

14. 49^3

     A 103619   **B** 117649   **C** 195319   **D** 159319   **E** 207379

15. 12 has six factors, 1, 2, 3, 4, 6 and 12.

How many factors does 360 have?

     A 16   **B** 18   **C** 22   **D** 24   **E** 26

16. x and y are two quantities. Rishi calculates that 80% of 50% of x is equal to 40% of 30% of y. Which of the following is true?

     A $y = \dfrac{x}{2}$ **B** $y = \dfrac{x}{3}$ **C** $y = 4x$ **D** $y = \dfrac{8}{3}x$ **E** $y = \dfrac{10}{3}x$

17. How many of the following staements are true?

A multiple of 4 is always a multiple of 8

A multiple of 9 always has the sum of its digits equal to a multiple of 9

The square of an odd nnumber is always an odd number

All prime numbers are odd

A 0   **B** 1   **C** 2   **D** 3   **E** 4

18. A sequence begins, 2, 9, 18, 29, 42, ...

What is the 98th term of this sequence?

A 8947   **B** 9123   **C** 9395   **D** 9827   **E** 9993

19. Simplify,
$$(x+2y+1)^2 - (x-2y-1)^2$$

A $8xy+4x$ **B** $x^2+8xy+8y$ **C** $4xy+8x$ **D** $5x^2+8y^2+2$ **E** $2x^2+4xy+8y^2$

20. Convert, the partially recurring decimal, 0.1636363636363...., to a fraction in lowest terms.

A $\dfrac{9}{55}$ **B** $\dfrac{17}{111}$ **C** $\dfrac{81}{495}$ **D** $\dfrac{147}{900}$ **E** $\dfrac{163}{990}$

21. Simplify,
$$8c^2d\times(4cd)^2$$

A $144c^4d^3$ B $128c^3d^2$ C $32c^4d^3$ D $128c^4d^3$ E $32c^3d^3$

22. Solve the equation to find the value of *x*.
$$\frac{7x}{2} - \frac{x-1}{8} = -1$$

A $-\frac{1}{3}$ B $\frac{1}{3}$ C $-\frac{7}{27}$ D $-\frac{2}{27}$ E $\frac{1}{54}$

23. What is the Lowest Common Multiple (LCM) of 38808 and 1320?

A 64 680   **B** 194 040   **C** 582 120   **D** 1 552 320   **E** 2 134 440

24. The total takings from tickets sales at a cricket match in Kolkata are INR 11028864. Each ticket costs INR 112. How many spectators are there?

    A 98472   **B** 96582   **C** 94647   **D** 92886   **E** 97452

25. Solve, $12x^2 + 13x - 14 = 0$

    A $\dfrac{1}{2}, -\dfrac{4}{7}$ **B** $\dfrac{3}{2}, \dfrac{6}{7}$ **C** $-\dfrac{1}{2}, -\dfrac{4}{7}$ **D** $-\dfrac{3}{2}, \dfrac{7}{4}$ **E** $\dfrac{2}{3}, -\dfrac{7}{4}$

Questions 26 - 35 each carry 3 marks

26. What is the square root of, $x^4 - 6x^3 + 17x^2 - 24x + 16$?

    A $x^2 - 4x + 16$ B $x^2 + 4x + 4$ C $x^2 - 3x - 4$ D $x^2 - 3x + 4$ E $x^2 + 3x - 4$

27. What is the remainder when $3x^4 - 7x^3 + 15x^2 - 23x - 5$ is divided by $(x-2)$?

    A 0   **B** 1   **C** 2   **D** 3   **E** 4

28. Sruti buys 4 cups of coffee and 3 cups of tea for $18.95. In the same cafe, Wajma buys 2 cups of coffee and 5 cups of tea and the total comes to $13.85. What is the cost of one cup of coffee?

    A $3.20   **B** $3.40   **C** $3.60   **D** $3.80   **E** $4.00

29. This irregular pentagram has angles as shown.

What is the size of *x*?

    A 31˚   **B** 33˚   **C** 38˚   **D** 43˚

        E Not enough information
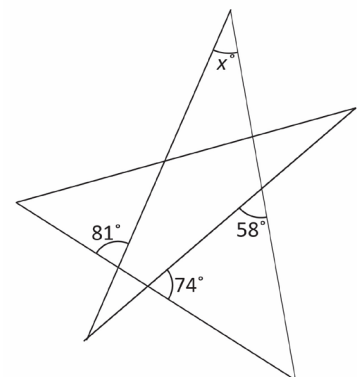
**30.** What is the equation of the line which is perpendicular to $3x+2y=7$ and which passes through the point with coordinates, (4, 3)?

    A $3x+2y=18$ **B** $3x-2y=6$ **C** $2x-3y=-1$ **D** $2x+3y=29$ **E** $2x+3y=7$

31. What is the maximum value of y, given that $y=12x-x^2-29$?

    A 7   **B** 8   **C** 9   **D** 10   **E** 11

32. Six semicircles are arranged around a regular hexagon. The distance from the centre of the hexagon to the centre of each semicirlce is 1 cm.
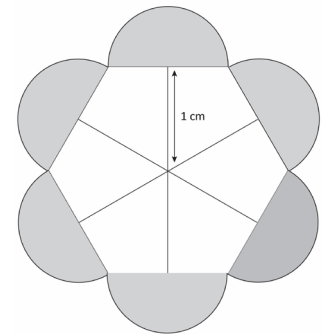
What is the total shaded area?

    A $\frac{3}{4}\pi$ cm^2 **B** π cm^2 **C** $\frac{9}{4}\pi$ cm^2

    D 4π cm^2 **E** 9π cm^2

33. A long line AB is divided at point C so that the ratio of lengths AC : CB is 5 : 3. CB is then divided at D in the ratio 5 : 3. DB is similarly divided at E in the same ratio and EB is again divided at F in the ratio 5 : 3. FB is 3 cm. How long is AB?
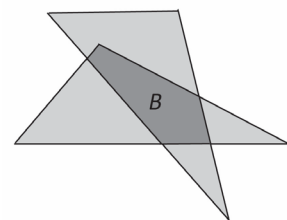
    A $\frac{64}{27}$ cm **B** $\frac{256}{27}$ cm **C** $\frac{512}{27}$ cm **D** $\frac{1012}{27}$ cm **E** $\frac{4096}{27}$ cm A

34. Two squares of side length 2 units and 6 units touch a circle as shown. What is the radius of the circle?

A 3 - √2

B 6 - 2√2

C 6 - √2

D 1 + √2

E 8 - 4√2
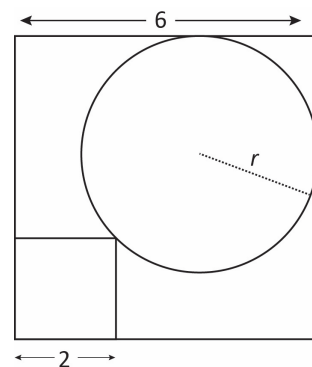
35. Two identical triangles overlap. The area of the overlapping region, B, is one sixth the area of the whole shaded region.

What fraction of the area of one triangle is the area B?

    A $\frac{2}{5}$ B $\frac{1}{6}$ C $\frac{2}{7}$ D $\frac{3}{8}$ E $\frac{2}{9}$

Questions 36 - 40 each carry 4 marks

36. In how many ways can 96 be expressed as the difference of two square integers?

A 0 **B** 1 **C** 2 **D** 3 **E** 4

37. Two congruent isosceles triangles overlap producing a hexagon in the middle. The areas of the smaller triangles are 4 and the larger triangels, 36, as shown.
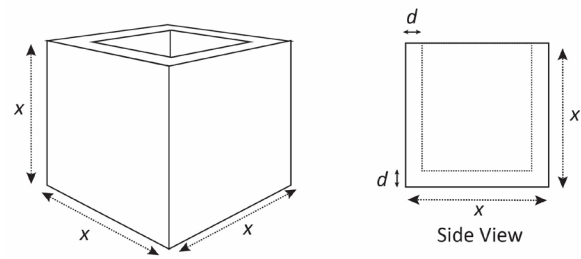What is the area of the hexagon?
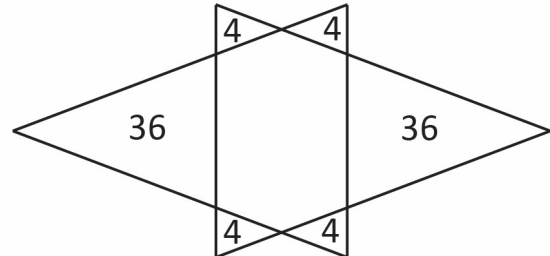
A 44 B 48 C 56 D 64 E 72

38. Simplify,

$$\left(1+\frac{1}{x}\right)\left(1-\frac{1}{x}\right)\left(\frac{1}{x+1}+\frac{1}{x-1}\right)$$

A $\dfrac{2}{x}$ **B** $\dfrac{2}{x^2}$ **C** $\dfrac{2}{x^2-1}$ **D** $\dfrac{2}{(x+1)(x-1)}$ **E** $\dfrac{2}{x^2(x+1)(x-1)}$

39. An open wooden box is a cube with edge length x cm. The sides and base have thickness d cm.
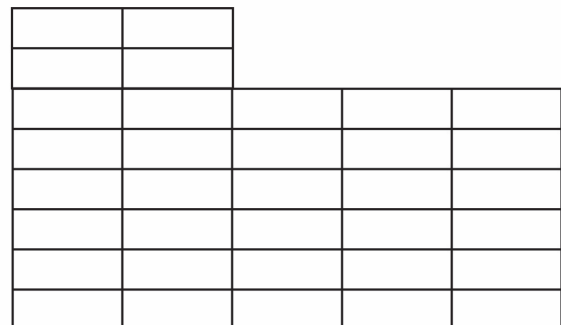
Which expression shows the total surface area?

A $5x^2+8dx+4d^2$ **B** $9x^2-6dx+d^2$ **C** $10x^2-12dx+8d^2$

D $10x^2-6dx+d^2$ **E** $10x^2-4dx+8d^2$

40. How many rectangles of all types are there?

A 34 B 56 C 289 D 324 E 360

Answer Key Intermediate IVMO 2022

1. A	11. A	21. D	31. A
2. D	12. B	22. A	32. B
3. C	13. D	23. B	33. E
4. D	14. B	24. A	34. E
5. D	15. D	25. E	35. C
6. C	16. E	26. D	36. E
7. A	17. C	27. B	37. C
8. A	18. E	28. D	38. A
9. C	19. A	29. B	39. C
10. D	20. A	30. C	40. E