



IVMO 2022 Junior
Time allowed - 1 Hour

Questions 1 - 25 each carry 2 marks

1. $98+198+298+398+498$

- A 1401 B 1490 C 1500 D 1510 E 1590

2. $600000-375072$

- A 335038 B 234028 C 224928 D 321618 E 225028

3. $\frac{4}{15} + \frac{3}{11}$

- A $\frac{7}{26}$ B $\frac{12}{165}$ C $\frac{99}{161}$ D $\frac{98}{315}$ E $\frac{89}{165}$

4. What is the whole number remainder when 123456789 is divided by 11?

- A 1 B 2 C 3 C 4 D 5 E 6

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

- A 277227722772 B 1234545678 C 432234432234 D 90817263542 E 623637661383

6. When using Vertically and crosswise to calculate 642×384 , what is the result of the third step before any carry digits have been added?

- A 52 B 54 C 62 D 65 E 68

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

- A
$$\begin{array}{r} 329 - 671 \\ \times 989 - 001 \\ \hline 325 /_7 3,8_1 1 \end{array}$$
- B
$$\begin{array}{r} 329 - 671 \\ \times 989 - 111 \\ \hline 325 /_7 3,8_1 1 \end{array}$$
- C
$$\begin{array}{r} 329 - 671 \\ \times 989 - 011 \\ \hline 325 /_7 3,8_1 1 \end{array}$$
- D
$$\begin{array}{r} 329 - 671 \\ \times 989 - 011 \\ \hline 325 /_6 3,8_1 1 \end{array}$$
- E
$$\begin{array}{r} 329 - 670 \\ \times 989 - 011 \\ \hline 325 /_7 3,8_1 1 \end{array}$$

8. Work out,

$$\frac{12345}{1+2+3+4+5}$$

- A 1 B 823 C 1029 D 2469 E 4115

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

- A 6718597 B 6728607 C 6619697 D 6718607 E 6718507

10. Convert the fraction, $\frac{81}{750}$, into a decimal.

- A 0.096 B 0.108 C 0.144 D 0.154 E 0.243

11. 2022^2

- A 4084884 B 4088484 C 4808844 D 4480884 E 4809484

12. What is the Highest Common Factor of 432 and 576?

- A 9 B 16 C 36 D 72 E 144

13. What is the Lowest Common Multiple of 432 and 576?

- A 1444 B 1560 C 1728 D 3456 E 249332

14. What is the largest prime number less than 20 multiplied by the smallest prime more than 20?

- A 323 B 377 C 391 D 437 E 483

15. What is the mean (average) of 8283, 8294, 8279, 8276 and 8288?

- A 8280 B 8282 C 8284 D 8286 E 8288

16. 83% of \$25.00

- A \$20.75 B \$20.50 C \$20.15 D \$19.75 E \$19.35

17. Using Nikhilam division for $24219 \div 897$, some workings are shown below. What are the three missing digits for A, B and C?

$$\begin{array}{r}
 897 \overline{) 24219} \\
 \underline{A \ B \ C} \\
 6 \ 1 \ 8 \\
 \underline{2 \ 7 \ 0 \ 0 \ 0}
 \end{array}$$

- A 328 B 283 C 206 D 308 E 204
18. Which is the correct digital root check for $4526 \times 3724 = 16854824$?

A $6 \times 4 \Rightarrow 24 \Rightarrow 6$ B $8 \times 7 \Rightarrow 56 \Rightarrow 2$ C $8 + 7 \Rightarrow 15 \Rightarrow 6$ D $17 + 16 \Rightarrow 33 \Rightarrow 6$ E $17 \times 16 \Rightarrow 263 \Rightarrow 2$

19. 0.000125^2

A 0.000625 B 0.00015625 C 0.00000015625 D 0.000000015625 E 0.000000000625

20. Given that $3 \times 37 = 111$, what is the remainder when 222 222 222 237 is divided by 37?

A 0 B 1 C 4 D 15 E 22

21. 8 kg of flour costs \$28. What is the cost of 5.2 kg of the same flour?

A \$9.10 B \$10.15 C \$18.20 D \$18.30 E \$24.60

22. The first five terms of a sequence are, 2, 9, 16, 23, 30,...

What is the 125th term in the sequence?

A 865 B 870 C 875 D 880 E 885

23. Given that $a = 12$ and $b = -3$, find the value of, $2(a+3) - (2b-a)$

A 12 B 24 C 33 D 36 E 48

24. Expand and simplify,

$$x(x+2y) - y(2x-y)$$

- A x^2+y^2 B x^2-y^2 C $x^2+4xy+y^2$ D $x^2+4xy-y^2$ E $x^2+2y-2xy+y$

25. Simplify,

$$8c^2d \times (4cd)^2$$

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

Questions 26 - 35 each carry 3 marks

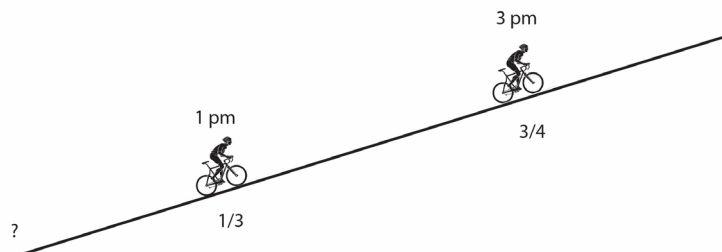
26. What is a half of a third, plus and third of a quarter, minus a quarter of a fifth?

- A $\frac{1}{2}$ B $\frac{1}{3}$ C $\frac{1}{4}$ D $\frac{1}{5}$ E $\frac{1}{6}$

27. Three boys ran a race. Arjuna took $1\frac{2}{3}$ hours. Bhishma took 95 minutes and Nakula took 1.6 hours. What was their mean time in hours and minutes?

- A 1 hr 31min B 1 hr 33min C 1 hr 35min D 1 hr 37min E 1 hr 39min

28. A cyclist sets out on a long uphill ride and travels at a constant speed. At 1pm he is one third of the way up the hill and at 3pm he is three quarters of the way up. What time did he set out?



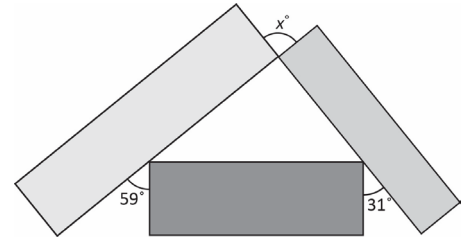
- A 11.24 am B 11.30 am C 11.36 am D 11.42 am E 11.48 am

29. A factory makes 58352 grams of honey and pours equal amounts of the honey into 112 jars. Which of the following could be the number of grams of honey left over?

- A 0 g B 12 g C 14 g D 16 g E 56 g

30. The diagram consists of three different rectangles with angles as shown. Each one touches two others.

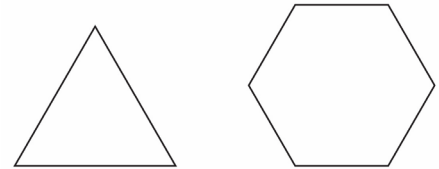
What is the size of angle x ?



- A 82° B 88° C 90° D 92° E 98°

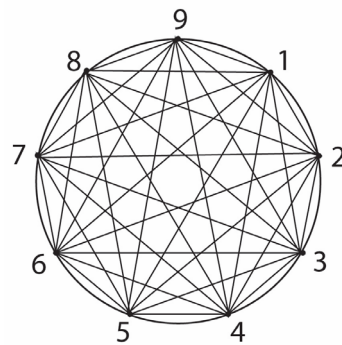
31. Each edge of an equilateral triangle is 6 cm and each edge of a regular hexagon is 3 cm long.

What is the ratio of the area of the triangle to the area of the hexagon?



- A 1:1 B 2:3 C 3:4 D 4:5 E 5:6

32. On the circle of nine points each number is joined to every other number with a line. The two numbers on the end of each line are multiplied. How many answers will be even?

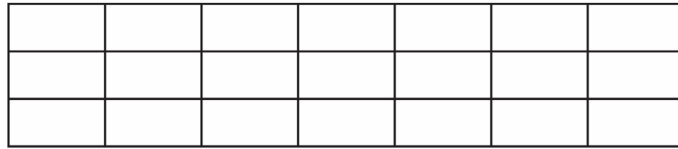


- A 14 B 18 C 22 D 26 E 30

33. Suki and Sharifa each have a collection of pressed flowers. Suki has 5 times as many as Sharifa. Suki has 84 more pressed flowers than Sharifa. She will share so that each have the same number. How many will each then have?

- A 48 B 63 C 72 D 84 E 96

34. How many rectangles of all types are in this grid?



- A 21 B 22 C 126 D 167 E 168

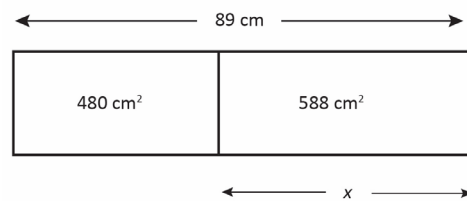
35. Solve the equation to find the value of x .

$$\frac{7x}{2} - \frac{x-1}{8} = -1$$

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

Questions 36 - 40 each carry 4 marks

36. A rectangle is divided into two rectangles with areas as shown. The length of the whole rectangle is 89 cm.



What is the length marked x ?

- A 49 cm B 51 cm C 54 cm D 55 cm E 57 cm

37. Last year the cost of gas in the UK was 7p per KWh. This year the price increased by 111%. Next year, the cost is expected to rise by 100%. What is the expected cost per KWh next year?

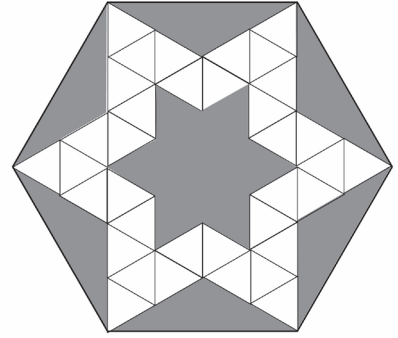
- A 7.77p B 14.77p C 15.54p D 29.54p E 31.08p

38. A large rectangular piece of paper measures 48 cm by 80 cm. It gets cut in half. One half piece is taken and cut in half to produce a quarter. One quarter piece is cut in half. This process is continued until there are seven cuts in total. What is the area of the smallest piece?

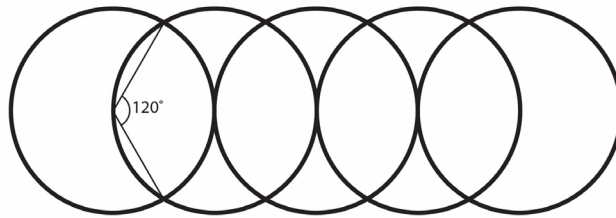
- A 15 cm² B 25 cm² C 30 cm² D 48 cm² E 60 cm²

39. The unshaded region inside this regular hexagon is divided into equilateral triangles. What fraction of the whole hexagon is **shaded**?

- A $\frac{2}{5}$ B $\frac{4}{9}$ C $\frac{5}{11}$ D $\frac{1}{2}$ E $\frac{3}{5}$



40. A logo is made using five circles as shown. Each circle has a radius of 3 cm. Using the value of π as $22/7$, what is the outer perimeter of the logo?



- A 22 cm B 31 cm C 37 cm D 44 cm E 98 cm

Answer Key Junior IVMO 2022

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