1. Let γ is the minimum value that satisfies the inequality $\left|-x+\frac{7}{6}\right| \leq \frac{1}{3}$ and λ is the maximum value that satisfies the inequality $\frac{11}{5}-\frac{3}{10}y \geq \frac{6}{15}$.

   Find the value of $\gamma\lambda$. **(2.5 Marks)**

2. Let a and b be positive integers. Let c_1 and c_2 be distinct prime numbers such that $c_1 < c_2$. If a and b are satisfied the equation $\sqrt{9-\sqrt{3}+\sqrt{a-c_2\sqrt{b}}} = \sqrt{3}+1$, find the maximum value of $\frac{b}{a-4}$. **(2.5 Marks)**

3. Find the value of $\frac{16\left(32\right)^n - 2^{3n-2}\left(4^{n+1}\right)}{15\left(2^{n-1}\right)\left(16^n\right)} - \frac{5\left(5^{n-1}\right)}{\sqrt{5^{2n}}}$. **(2.5 Marks)**

4. Let x, y, z be positive integers. Each number does not exceed 10, and they satisfy the following conditions:

   a. The sum of the three numbers is 15.

   b. The product of the three numbers is 84.

   c. The three numbers are ordered from least to greatest: $x < y < z$.

   Find the values of x^2+yz. **(2.5 Marks)**

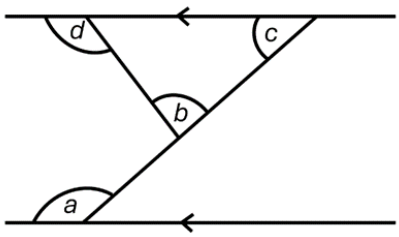
Copyright © 2025 ASMOPSS. All Rights Reserved.

5. If the volume of a cube is increased by 237.5%, what is the percentage increase in its surface area? **(2.5 Marks)**

6. Given that sphere and right square pyramid inscribed in a cube. Let the ratio of the volumes of sphere: cube: pyramid be equal to $A:B:C$. Find the value of $\frac{AC}{B^2}$. (Given that $\pi = 3.14$.) **(2.5 Marks)**

7. A right triangle has one leg of length 120 units. Find the number of triangles in which all sides are integers, and the perimeter is not more than 400 units. **(2.5 Marks)**

8. From the diagram below, **(2.5 Marks)**



if $a - c = 70^\circ$, find $a - d + b$.

Copyright © 2025 ASMOPSS. All Rights Reserved.

9. Find the value of x that satisfies the equation $\left(7+x\right)^{\frac{2}{3}}+\left(49-x^2\right)^{\frac{1}{3}}-2\left(7-x\right)^{\frac{2}{3}}=0$, where $x>0$. **(4.5 Marks)**

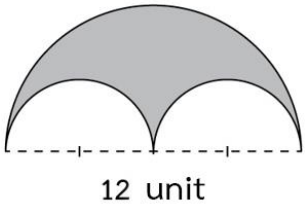
10. Let $2x^2+7x+3$ be a factor of $2x^3+a_1x^2+a_2x-6$, where $a_1,a_2\in\mathbb{R}$.
Find the value of a_1-a_2. **(4.5 Marks)**

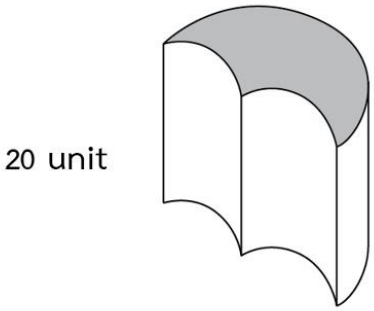
11. Let $\left(x,y\right)$ be a solution that satisfies the equation
$2=\sqrt{\sqrt{x\sqrt{x\sqrt{x\sqrt{x}}\ldots}}}-\sqrt{y\sqrt{y\sqrt{y\sqrt{y}}\ldots}}$, where x,y are integers and $0<y<x<10$.
Find the sum of all values x of ordered pairs $\left(x,y\right)$. **(4.5 Marks)**

12. Find the value of $\dfrac{\left(\sqrt{2}-2\right)\left(4+\sqrt{2}\right)+\left(3\sqrt{3}+2\sqrt{6}\right)}{3+2\sqrt{2}}+30-18\sqrt{2}-\sqrt{3}$.
(Given that $\sqrt{2}=1.414,\sqrt{3}=1.732$.) **(4.5 Marks)**

Copyright © 2025 ASMOPSS. All Rights Reserved.

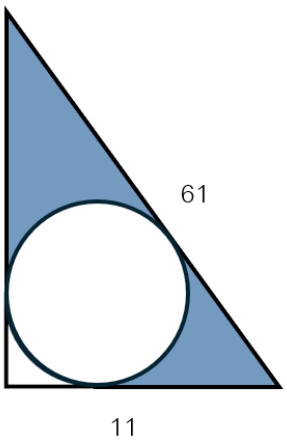
13. A solid has a base in the shape of a semicircle with a diameter of 12 units and a height of 20 units. The base is hollowed out by removing two identical semicircular regions as shown below. Find the volume of the solid. (Given that $\pi = 3.14$.) **(4.5 Marks)**





14. From the diagram, find the area of the shaded region. (Given that $\pi = 3.14$.)

(4.5 Marks)



15. The scores of five students, arranged in ascending order are

$$23,\ 23,\ x,\ y,\ 32\,.$$

A student scores 3 points higher than at least one student. The data set is bimodal, and the mean equals the median. Find the value of $x + y$. **(4.5 Marks)**

Copyright © 2025 ASMOPSS. All Rights Reserved.

16. Find the sum of all prime factors of a number $932^3 - 345^3 - 587^3$. **(6 Marks)**

17. Let $A = \frac{1}{3 \cdot 4} + \frac{6}{7 \cdot 13} - \frac{5}{3 \cdot 8} + \frac{2}{13 \cdot 15}$ and $B = \frac{\sqrt{14 + 6\sqrt{5}}}{3} + \frac{\sqrt{30 - 10\sqrt{5}}}{\left(\sqrt{5} - \sqrt{2}\right)\left(\sqrt{2} + \sqrt{5}\right)}$.

    Find the value of $56A + 3B$. **(6 Marks)**

18. If a square steel sheet is cut into three parts, two identical circles (for the top and bottom lids) and one rectangle (for the curved surface), to form a cylinder with a volume of $\frac{660}{49}$ cubic units, what is the minimum side length of the square sheet required? (Given that $\pi = \frac{22}{7}$.) **(6 Marks)**

Copyright © 2025 ASMOPSS. All Rights Reserved.

19. Given that a triangle ABC, $\overline{BD}$ be the angle bisector of $A\hat{B}C$ with point D on $\overline{AC}$. If lengths of $\overline{AB}$ and $\overline{AC}$ are 4 units and 9 units, respectively. What is the greatest possible integer length of $\overline{AD}$? **(6 Marks)**

20. When two dice are rolled, the probability of getting a total of 7 is 0.14, which differs from the theoretical value. It is known that only one side of a die with a score of 2 is weighted. Find the probability that a die shows the number 2 on one roll. **(6 Marks)**

Copyright © 2025 ASMOPSS. All Rights Reserved.

21. Let the current age of the father be 'a' years old and the current age of his son be 'b' years old. Four years ago, the sum of their ages was 32 years. In the next 10 years, the father's age will be three times that of his son. Find the value of $\frac{a}{b^3}$. **(2.5 Marks)**

22. Bottle A contains 2 liters of a beverage with 5% alcohol. It is mixed with the beverage in Bottle B, which has a volume of 3 liters. After mixing well, 3 liters of the mixture are removed. The remaining mixture is then combined with the beverage in Bottle C, which has a volume of 3 liters and contains 8% alcohol. If the last mixture has an alcohol concentration of 27.56%, find the alcohol concentration of Bottle B? **(4.5 Marks)**

23. Determine the area enclosed by the graph of the equation $2|x|+|y|=3$. **(2.5 Marks)**

Copyright © 2025 ASMOPSS. All Rights Reserved.

24. Let P_1 and P_2 be the center points of two circles with a radius of 8 and 15 units, respectively. Let Q be the intersection point of the two circles, such that P_1QP_2 forms a right angle. Find the largest area of a circle contained within the region of overlap of these two circles. (Given that $\pi = 3.14$.) **(4.5 Marks)**

25. A box contains 288 different even-numbered cards, and each card has an equal chance of being selected. If some odd-numbered cards are added to the box so that the probability of randomly selecting an odd-numbered card is equal to $\frac{1}{7}$, find the minimum number of odd-numbered cards that need to be added. **(4.5 Marks)**

Copyright © 2025 ASMOPSS. All Rights Reserved.

GRADE 9 ANSWER KEY

No.	Answer	No.	Answer
1	5	14	246.13
2	6.25	15	52
3	1	16	853
4	**46	17	5.27
5	125	18	6.29
6	0.17	19	3
7	6	20	0.5
8	70	21	0.28
9	9	22	91.5
10	14	23	9
11	35	24	28.26
12	4	25	48
13	565.2		

** Note: Question 4 had a printing error. All examinees will receive full marks for this question as decided by the exam committee.

Copyright © 2025 ASMOPSS. All Rights Reserved.