

2008-09 Grade 9 CHAMP Math Contest

Part A: (5 credits each)

1. A tank is $\frac{1}{6}$ full of gasoline. If 8 litres of gas are added, then the tank is $\frac{1}{4}$ full. The total capacity of the tank, in litres, is:

- a) 24 b) 32 c) 48 d) 96 e) 120

2. How many of the first one-hundred positive integers are divisible by all of the numbers: 2, 3, 4, & 5?

- a) 0 b) 1 c) 2 d) 3 e) 4

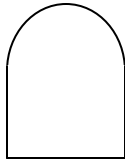
3. For $x \neq 0$, $\frac{1}{x} + \frac{1}{2x} + \frac{1}{3x}$ equals:

- a) $\frac{1}{2x}$ b) $\frac{1}{6x}$ c) $\frac{5}{6x}$ d) $\frac{11}{6x}$ e) $\frac{1}{6x^3}$

4. A six-team league has a schedule which requires each team to play every other team four times. What is the total number of games in the league schedule?

- a) 60 b) 80 c) 96 d) 40 e) 24

5. A window consists of a rectangle surmounted by a semi-circle. The rectangular portion has a width of 2 m and a height of 1 m. What is the perimeter of the window?



- a) $4 + 2\pi$ b) $6 + 2\pi$ c) $4 + \pi$ d) $6 + \pi$ e) $6 + 4\pi$

6. A class of 20 students averaged 66% on a test, and another class of 30 averaged 56% on the same test. The average for all 50 students was:

- a) 58% b) 59% c) 60% d) 61% e) 62%

7. Simplify:

$$\frac{1}{1 - \frac{1}{2 - \frac{1}{3 - \frac{1}{4}}}}$$

- a) $\frac{18}{7}$ b) $-\frac{1}{12}$ c) $\frac{4}{7}$ d) $\frac{1}{2}$ e) $\frac{7}{4}$

8. A palindrome is a number that reads the same forwards and backwards. (e.g. 13431). How many three-digit palindromes are even?

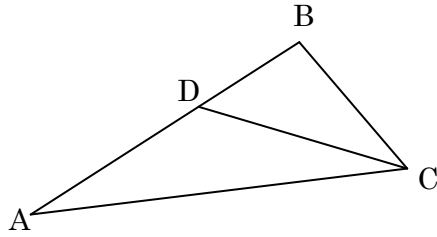
- a) 30 b) 36 c) 40 d) 45 e) 50

9. Evaluate: $-3^2 + 5 \times 2$

- a) -8 b) 19 c) 90 d) -2 e) 1

2008-09 Grade 9 CHAMP Math Contest

10. In the diagram below, if $AD = CD = CB$ and $\angle A = 40^\circ$, then the measure of $\angle DCB$ is:



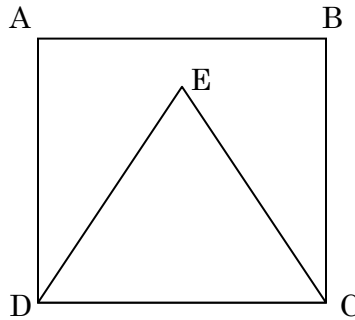
- a) 40° b) 35° c) 25° d) 20° e) 10°

Part B: (6 credits each)

11. Find the value of $\left(1 + \frac{1}{1}\right) \times \left(1 + \frac{1}{2}\right) \times \left(1 + \frac{1}{3}\right) \times \dots \times \left(1 + \frac{1}{2008}\right)$.

- a) 0 b) 2008 c) 2009 d) 4016 e) $\frac{2009}{2008}$

12. If ABCD is a square and ECD is an equilateral triangle, then the measure of $\angle AEB$ is:



- a) 90° b) 120° c) 135° d) 150° e) 165°

13. In the sequence of numbers: 1, 3, 2, ..., each term after the first two is equal to the term preceding it minus the term preceding that. The sum of the first 100 terms is:

- a) 5 b) 4 c) 2 d) 1 e) -1

14. Suppose that $a * b = b + \frac{1}{a}$. The value of $(1 * 2) * (2 * 1)$ is:

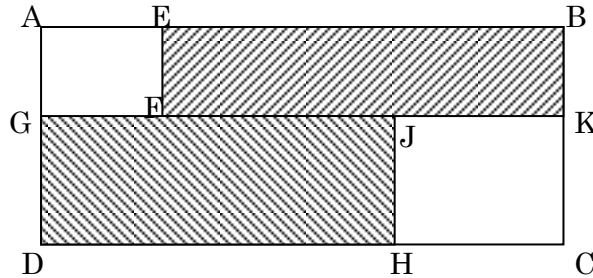
- a) $\frac{3}{10}$ b) $\frac{9}{7}$ c) $\frac{11}{3}$ d) $\frac{10}{3}$ e) $\frac{11}{6}$

15. How many digits are needed to write all of the integers from 1 to 1000 inclusive? For example, to write the numbers from 1 to 10 inclusive, one would need 11 digits.

- a) 2889 b) 2892 c) 2893 d) 2899 e) 2989

2008-09 Grade 9 CHAMP Math Contest

16. A rectangle $ABCD$ has a square $A EFG$ of area 9 units² and a square $JKCH$ of area 16 units² removed. If $GFJK$ is a straight line segment and the length of $FJ = 5$, then the total area of the shaded rectangles, in units², is:

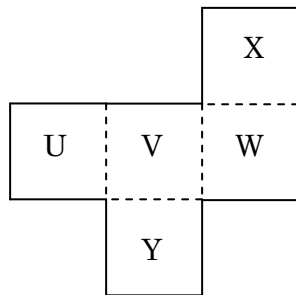


- a) 50 b) 56 c) 59 d) 60 e) 62

17. A pipe that takes 30 minutes to fill a tank is shut off, after the water has been running for 10 minutes. A second pipe is then opened and it finishes filling the tank in 15 minutes. How many minutes would it have taken the second pipe to fill the tank by itself, from empty to full?

- a) 10 b) 22.5 c) 25 d) 32.5 e) 45

18. The sheet of paper shown is folded along the dotted lines to form an open box with the opening on top. Which letter is on the bottom?



- a) U b) V c) W d) X e) Y

19. If $a = 2b$ and $b = 4c$, then $a + 2b - 8c$ equals

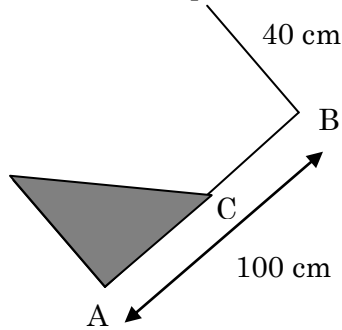
- a) $8c$ b) $16c$ c) $12c$ d) $24c$ e) $4c$

20. There are two cards: one is red on both sides & the other is red on one side and blue on the other. The cards have the same probability of being chosen. One card is chosen and placed on the table. If the top sides of the card on the table is red, then the probability that the bottom side is also red is:

- a) $\frac{1}{4}$ b) $\frac{1}{3}$ c) $\frac{1}{2}$ d) $\frac{2}{3}$ e) $\frac{3}{4}$

Part C: (8 credits each)

21. A fish tank, filled with water, is 100 cm long, 60 cm wide, and 40 cm high. It is tilted, as shown, resting on its 60 cm edge, with the water level reaching C, the midpoint of AB. No water is poured out. Find the depth of the water in the fish tank once AB is returned to a horizontal position.

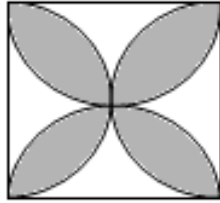


- a) 10 cm b) 20 cm c) 24 cm d) 30 cm e) 48 cm

22. Three stones are weighed on a scale, two at a time. The scale shows weights of 49 kg, 63 kg, and 80 kg. How much does the heaviest stone weigh?

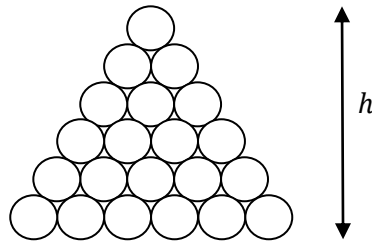
- a) 30 kg b) 36 kg c) 40 kg d) 47 kg e) 64 kg

23. The overlapping regions of four identical semi-circles have been shaded in the diagram below. If the square has sides lengths of 4, the total area of the shaded region is:



- a) 4π b) $8\pi - 16$ c) $16 - 4\pi$ d) $16\pi - 16$ e) $32\pi - 16$

24. Identical balls are piled as shown in the figure below. The diameter of each ball is 4 cm. What is the height of a pile containing six levels?



- a) $\sqrt{300}$ cm b) 20 cm c) 24 cm d) $\sqrt{432}$ cm e) $4 + \sqrt{300}$ cm

25. The mathematician Augustus De Morgan lived in the nineteenth century. He once said that he was x years old in the year x^2 . In what year was De Morgan born?

- a) 1801 b) 1806 c) 1848 d) 1849 e) 1860