

## MATH CATEGORY - MIDDLE GROUPS (Grades 7-8-9)

1. Find the value of  $x$ , if  $\left(\frac{1}{8}\right)^4 = 2^{x-3}$

- A) -15      B) -9      C) -6      D) 6

2. Jane paid 18\$ to fully charge her electric car while the odometer on her car was showing 78737 km. Now the odometer is showing 78937 km and Jane pays another 18\$ to fully charge her car. How much money did this car consume on electric energy per km?

- A) 0.05 \$      B) 0.07 \$  
C) 0.08 \$      D) 0.09 \$

3. Alex has forgotten the two digits of the password of the four-digit bike lock, as shown in the picture. What is the difference between the largest and the smallest possible password provided that the X and Y numbers are different numbers?

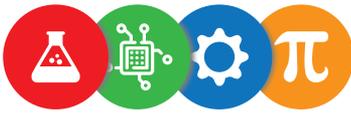


- A) 808      B) 88      C) 907      D) 97

4. Harry is traveling from Vienna to Rome with his electric car. The battery of the vehicle is fully charged in 30 minutes and it can travel 320 km in total with a full battery. Considering that Harry is traveling at a constant speed of 120 km per hour, how soon can he complete the journey from Vienna to Rome, which is 1,120 km in total? (The vehicle's battery is 50% charged at the start.)

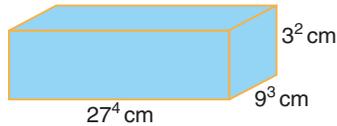


- A) 8 hours 50 minut  
B) 9 hours 20 minut  
C) 9 hours 40 minut  
D) 10 hours 50 minut



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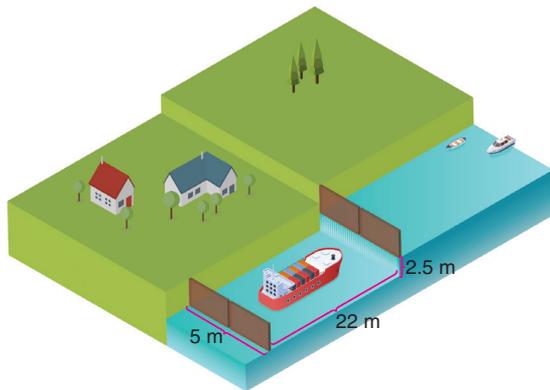
5.



What is the volume of the rectangular prism in  $\text{cm}^3$ ?

- A)  $3^{20}$     B)  $3^{18}$     C)  $3^{15}$     D)  $3^{12}$

6.



In some parts of the river Rhine, there are some elevation differences due to the natural structure of the river. These level difference problems are solved with special transfer pools and as a result, the cargo ships can continue their journey safely. The dimensions of the rectangular pool in the picture are 5 m x 22 m. How much water should be pumped into the first transfer pool so that the ship could continue its upward journey if the elevation difference between the pools is 2.5 m?

- A)  $110 \text{ m}^3$     B)  $220 \text{ m}^3$     C)  $275 \text{ m}^3$     D)  $325 \text{ m}^3$

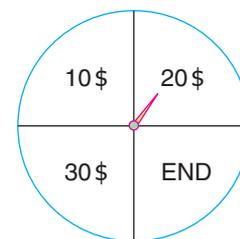
7.

By using the digits 2, 3, 4 all positive integers are written in ascending form like 2, 3, 4, 22, 23, 24, .... Find the 124<sup>th</sup> number?

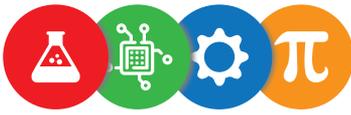
- A) 22342    B) 22222    C) 22223    D) 22232

8.

You spin a wheel and it randomly lands on 10\$, 20\$, 30\$ or END. If you land on 10\$, 20\$ or 30\$ you get that money and spin the wheel again. You keep continuing until you land on END. What is the probability that the game ends with you have won exactly 40\$?



- A)  $37/512$     B)  $61/1024$     C)  $5/64$     D)  $35/512$



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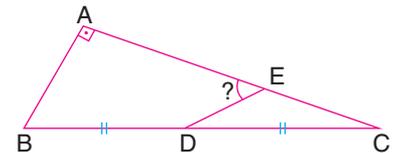
9. For integers  $x$  and  $y$ ,  $(3x-4)$  and  $(y+2)$  are relatively prime numbers. If  $3xy-4y+6x=28$ , what is the maximum value of the product of  $x$  and  $y$ ?

A) -8      B) -6      C) 8      D) 6

10. An insect starts to move strictly on the line between points  $A(1, 3)$  and  $B(17, 43)$ . How many points on this line does that insect pass through that have integer coordinates?

A) 4      B) 5      C) 7      D) 9

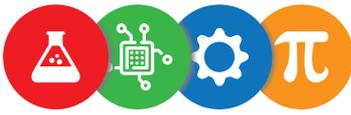
11.  $AB \perp AC$ ,  $BD=DC$  and  $AB+EC=AE$ . What is the measure of  $\angle AED$  in degrees?



A) 30      B) 40      C) 45      D) 60

12. What is the digit before the zeros at the end of the number equals to  $20! - 21!$  ?

A) 3      B) 5      C) 6      D) 8



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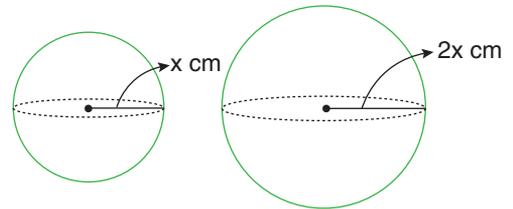
13.



The distance between Amsterdam and Rotterdam is 148 km. A cyclist left Amsterdam towards Rotterdam with a speed of 80 km/hr. At the same time, another cyclist left Rotterdam towards Amsterdam with a speed of 36 km/hr. The first cyclist stopped for a 10 min break while the other cyclist stopped for 5 min. After a while they met in Leiden. Find the distance between Leiden and Rotterdam.

- A) 48      B) 60      C) 66      D) 71

15.

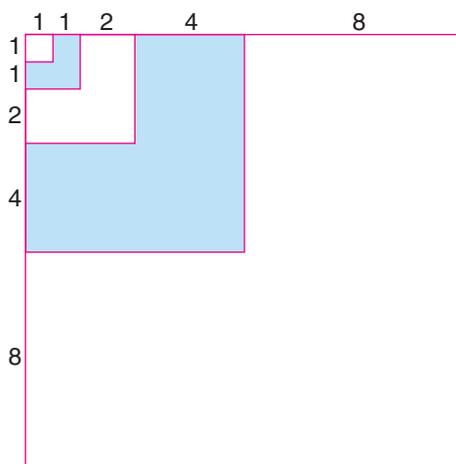


The volume of the smaller sphere is  $10 \text{ cm}^3$ . What is the volume of the larger sphere?

- A)  $60 \text{ cm}^3$     B)  $80 \text{ cm}^3$     C)  $100 \text{ cm}^3$     D)  $180 \text{ cm}^3$

14.

Find the shaded area.



- A) 45      B) 47      C) 49      D) 51

16.

If  $\overline{abc} = 3 \cdot \overline{bc} + \frac{c}{2}$ , find the number of different values of  $c$ . Here  $\overline{abc}$  is 3-digit and  $\overline{bc}$  is 2-digit number.

- A) 4      B) 5      C) 2      D) 1