M. Prakash Institute **30 Jan 2022**

Entrance Test for VII std students (going to 8th std) **7 - 8 pm**

1. What will be the digit in hundreds place if 11 numbers in series $3, 33, 333, 3333, \cdots$ are added?

   Solution: Since we are interested in the digit at hundred's place, we can take only last three digits of all numbers. So, we need to calculate $(3+33)+(333+333+\cdots+333)$ here, 333 appears 9 times. So, we need to calculate $3+33+9\times 333 = 36+2997 = 3033$. So, the answer is 0.

2. Find the value of $\dfrac{0.36\times 0.27\times 0.001}{0.06\times 0.03\times 0.1\times 0.2} =$

   Solution: Let's first remove the decimal points.
   $$\frac{0.36\times 0.27\times 0.001}{0.06\times 0.03\times 0.1\times 0.2} = \frac{(0.36)(100)\times(0.27)(100)\times(0.001)(1000)}{(0.06)(100)\times(0.03)(100)\times(0.1)(10)\times(0.2)(10)\times 10}$$
   $$= \frac{36\times 27}{6\times 3\times 2\times 10} = 2.7$$

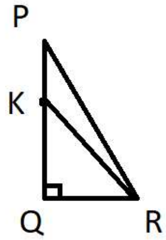
3. $x\%$ of $y\%$ of $z\%$ of $8000 = 40\%$ of $y\%$ of z. Find $x\%$ of 1800.

   Solution: We have $\frac{x}{100}\times\frac{y}{100}\times\frac{z}{100}\times 8000 = \frac{40}{100}\times\frac{y}{100}\times z \Rightarrow x = 0.5$.
   So, 0.5% of $1800 = \frac{0.5}{100}\times 1800 = 9$.

4. $\sqrt{200}$ lies between consecutive natural numbers m and $m+1$. $\sqrt{300}$ lies between consecutive natural numbers n and $n+1$. $\sqrt{500}$ lies between consecutive natural numbers k and $k+1$. Find $m+n+k$.

   Solution: $196 < 200 < 225$, i.e. $14^2 < 200 < 15^2$, so $m = 14$.
   $289 < 300 < 324$, i.e. $17^2 < 300 < 18^2$ so $n = 17$.
   $484 < 500 < 529$, i.e. $22^2 < 500 < 23^2$, so $k = 22$. So, $m+n+k = 14+17+22 = 53$

5. In $\triangle PQR, \angle Q = 90°$. $PQ = 12, PR = 13$. K is a point on side PQ such that $PK : KQ = 1 : 5$. Find KR^2.



   Solution: By Pythagoras theorem in $\triangle PQR$, we get
   $QR^2 = PR^2 - PQ^2 = 169 - 144 = 25 \Rightarrow QR = 5$
   Let $PK = x$, so $KQ = 5x$. Hence $PQ = PK + KQ = x + 5x = 6x$. But $PQ = 12$, so we get $KQ = 10$. Again by Pythagoras theorem in $\triangle KQR$, we get $KR^2 = KQ^2 + QR^2 = 10^2 + 5^2 = 125$.

6. Reena's age to Teena's age is 7 : 5. Ratio of Teena's age to Seena's age is 2 : 3. Sum of ages of all three girls is 39 . Find Teena's age.

   Solution: Let Teena's age be x. So, Reena's age is $\frac{7}{5}x$ and Seena's age is $\frac{3}{2}x$, so we get $x + \frac{7}{5}x + \frac{3}{2}x = 39 \Rightarrow x(1+\frac{7}{5}+\frac{3}{2}) = 39 \Rightarrow x(\frac{39}{10}) = 39 \Rightarrow x = 10$

7. How many cubes with side 2 can be prepared by melting an aluminium cube with side 8?

Solution: Volume of a cube of side 2 is $2^3 = 8$. Volume of the aluminium cube $= 8^3$. So, number of cubes that can be prepared is given by $\frac{8^3}{2^3} = \left(\frac{8}{2}\right)^3 = 4^3 = 64$.

8. $\frac{2}{3}\sqrt{576} + \frac{3}{4}\sqrt{784} + \frac{2}{5}\sqrt{625} =$

Solution: $\sqrt{576} = 24$, $\sqrt{784} = 28$, $\sqrt{625} = 25$. So, $\frac{2}{3}\sqrt{576} + \frac{3}{4}\sqrt{784} + \frac{2}{5}\sqrt{625} = (\frac{2}{3})(24) + (\frac{3}{4})(28) + (\frac{2}{5})(25) = 16 + 21 + 10 = 47$.

9. Two positive numbers a and b are such that $a : b = 3 : 4$. $a^2 + b^2 = 100$. Find $a + b$.

Solution: Let $a = 3k, b = 4k$. So, $a^2 + b^2 = 9k^2 + 16k^2 = 25k^2$. Therefore, $25k^2 = 100 \Rightarrow k = 2 \Rightarrow a = 6, b = 8 \Rightarrow a + b = 14$

10. On real number line distance between points with coordinates $\frac{10}{3}$ and $-\frac{18}{7}$ is D_1 and distance between points with coordinates $-\frac{5}{31}$ and $\frac{11}{62}$ is D_2. Find $D_1 D_2$.

Solution: $D_1 = \frac{10}{3} - (-\frac{18}{7}) = \frac{10}{3} + \frac{18}{7} = \frac{(10)(7)+(18)(3)}{(3)(7)} = \frac{124}{21}$
$D_2 = \frac{11}{62} - (-\frac{5}{31}) = \frac{11}{62} + \frac{5}{31} = \frac{11+10}{62} = \frac{21}{62}$
$\therefore D_1 D_2 = \frac{124}{21}\frac{21}{62} = 2$

11. B has money equal to $\frac{2}{5}^{th}$ of A. C has money equal to $\frac{7}{9}^{th}$ of B's. In all, they have 385 Rs. How much money does C have?

Solution: So we have $A + (\frac{2}{5})A + (\frac{2}{5})(\frac{7}{9})A = 385 \Rightarrow A(\frac{45+18+14}{45}) = 385 \Rightarrow A = 225$. So $C = (\frac{2}{5})(\frac{7}{9})225 = 70$

12. Find the value of $\dfrac{1+k}{1-k} + \dfrac{2k+3}{2k-3}$ if $k = \dfrac{4}{3}$.

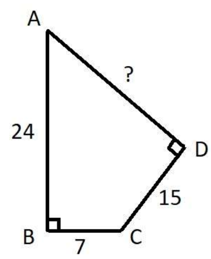
Solution: $\dfrac{1+k}{1-k} + \dfrac{2k+3}{2k-3} = \dfrac{1+\frac{4}{3}}{1-\frac{4}{3}} + \dfrac{2(\frac{4}{3})+3}{2(\frac{4}{3})-3} = -7 + (-17) = -24$

13. A is cycling at the speed of 10 km/hr. B is cycling at the speed of 8 km/hr. Both start moving simultaneously from two places 1 km apart in the same direction. How far (in kms) will A have cycled before he overtakes B.

Solution: Suppose A overtakes B after t hours. So, difference in the distance travelled by A and B must be 1 km. In t hours, A travels $10t$ km and B travels $8t$ km. So, we get $10t - 8t = 1 \Rightarrow t = \frac{1}{2}$ hours. So, distance travelled by A $= 10(\frac{1}{2}) = 5$ km.

14. $\square ABCD$ is such that $\angle ABC = \angle ADC = 90°$
$AB = 24$, $BC = 7, CD = 15$. Find AD.

Solution: By applying Pythagoras theorem in $\triangle ABC$ and $\triangle ADC$, we get $AC^2 = AB^2 + BC^2 = AD^2 + DC^2 \Rightarrow 24^2 + 7^2 = 15^2 + AD^2$
$\Rightarrow AD^2 = 576 + 49 - 225 = 400 \Rightarrow AD = 20$



15. Which of the following numbers is greater than $\frac{5}{7}$ but smaller that $\frac{11}{14}$.

(A) $\frac{6}{7}$ (B) $\frac{16}{21}$ (C) $\frac{4}{7}$ (D) $\frac{19}{21}$.

Report 10 if answer is A, 20 if answer is B, 30 if answer is C, 40 if answer is D.

Solution: Let's write all fractions with same denominator: Given numbers are $\frac{5}{7} = \frac{30}{42}, \frac{11}{14} = \frac{33}{42}$. The options are (A) $\frac{6}{7} = \frac{36}{42}$, (B) $\frac{16}{21} = \frac{32}{42}$, (C) $\frac{4}{7} = \frac{24}{42}$, (D) $\frac{19}{21} = \frac{38}{42}$. So, clearly 32 is between 30 and 33, so option B is correct. Answer 20.

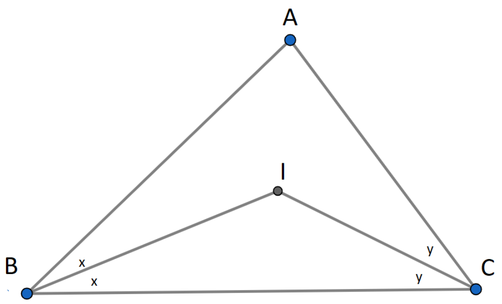
16. If 30 workers finish a job in 56 days, how many more workers should be employed to finish the same job in 24 days?

Solution: One worker will need 30×56 days to finish the job. So, n workers will need $\frac{(30\times56)}{n}$ days. So, we get $\frac{1680}{n} = 24 \Rightarrow n = \frac{1680}{24} = 70$. So $70 - 30 = 40$ more workers should be employed.

17. Sindhu must score 40% marks to pass an examination. She gets 295 marks which is 35 marks more than passing marks. What are the maximum marks in the examination?

Solution: $295-35$ is 40% of the maximum marks. So, maximum marks $= \frac{260}{0.4} = 650$.

18. As shown in figure $\overline{BI}$ and $\overline{CI}$ are internal angle bisectors of $\angle B$ and $\angle C$ respectively. If m$\angle BIC = 115$ degrees then find m$\angle BAC$ in degrees.



Solution: From the figure, we get, in $\triangle BIC$, $x + y + 115 = 180 \Rightarrow x + y = 65$. In $\triangle ABC$, we have $\angle BAC + 2x + 2y = 180 \Rightarrow \angle BAC = 180 - 2x - 2y = 50$

19. Sum of the three consecutive even natural numbers is 2022. Find the smallest amongst them.

Solution: Let the smalles number be n. So, $n+(n+2)+(n+4) = 2022 \Rightarrow 3n+6 = 2022 \Rightarrow 3n = 2016 \Rightarrow n = 672$.

20. Meaning of a^b is a multiplied to a, b times. For example $a^4 = a \times a \times a \times a$. If $93 = 3^x + 3^y + 3^z$ where x, y, z are natural numbers, find $x + y + z$.

Solution: $93 = 81 + 9 + 3 = 3^4 + 3^2 + 3^1 \Rightarrow x = 4, y = 2, z = 1 \Rightarrow x + y + z = 7$

Answer Key

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans	0	2.7	9	55	125	10	64	47	14	2
Q.No.	11	12	13	14	15	16	17	18	19	20
Ans	70	−24	5	20	20	40	650	50	672	7