M. Prakash Institute **20 Nov 2022**

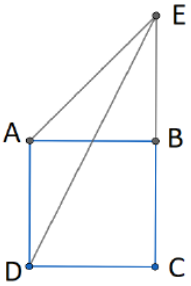
Solutions - Entrance Test for VII std students (going to 8th) 10 am - 12 noon

Q.1. Sum of five consecutive even natural numbers is 280 . Find the largest number.
Solution: Let the largest number be n, so the remaining numbers are $n-2, n-4, n-6, n-8$. So, their sum is $5n-20$. Hence $5n-20=280 \Rightarrow n=60$. **Ans. 60**.

Q.2. How many times should 2022 be subtracted from 161761 to get remainder 2023 ?
Solution: It is same as asking what is the quotient when $(161761-2023)$ is divided by 2022 ? So, do the division: $159738 \div 2022 = 79$. **Ans. 79**.

Q.3. The number of whole numbers between $\sqrt{3}$ and $\sqrt{290}$ is
Solution: We know that $3<4$, so immediate whole number after $\sqrt{3}$ is $\sqrt{4}$ i.e. 2. Also, $17^2=289$, so the largest natural number smaller than $\sqrt{290}$ is 17. So, the answer is 16. **Ans. 16**.

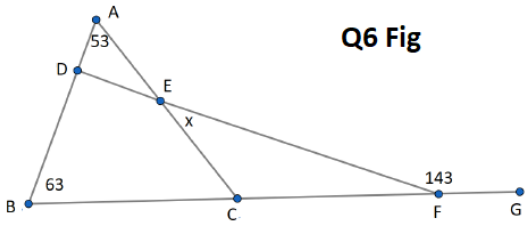
Q.4. $ABCD$ is a square. ABE is isoceles triangle external to square with $AB=BE$. If area of $\triangle ADE$ is 18 , find area of $\square ADCE$.
Solution: area$(\triangle ADE) = \frac{1}{2}(AD)(AB)$ which is given as 18. So, we get $\frac{1}{2}(AD)(AB)=18$. Since $\square ABCD$ is a square, $AB=AD$, so we get $AB=AD=6$. Also, since $AB=BE$, we have $BE=6$. Area$(ADCE)$ = area$(\square ABCD)$+ area$(\triangle ABE) = (6)(6)+\frac{1}{2}(6)(6) = 54$. **Ans. 54**.



Q.5. Four points P, Q, R, S are on the line in that order.

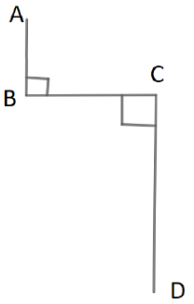
If $PQ:QR=2:3, QR:RS=4:3$, then $PQ:QS=a:b$. Find $a+b$. Note a, b are coprimes. (i.e. they do not have any common factor.)
Solution: Since QR is the common segment in both ratios and the numbers corresponding to it are 3 and 4, let's assume that $QR=12$. This gives $PQ=8$ and $RS=9 \Rightarrow PQ=8$, $QS=12+9=21$, so $PQ:QS=8:21$. So, $a+b=29$. **Ans. 29**.

Q.6. Find x in following figure.
Solution: Observe that $m\angle ACF = m\angle ABC + m\angle ACB = 116$. Also, using $\triangle CEF$, we have $x+m\angle ACF = m\angle EFG \Rightarrow x+116=143 \Rightarrow x=27$. **Ans. 27**.



Q.7. The ratio of the present ages of a mother and her daughter is 5:1. After 10 years the ratio of their ages will be 5 : 2. Find the mother's present age.
Solution: Let's assume the present ages of mother and daughter as $5x$ and x. SO, after 10 years, their ages are $5x+10$ and $x+10$. So, we get $\frac{5x+10}{x+10}=\frac{5}{2} \Rightarrow 10x+20=5x+50 \Rightarrow 5x=30$, so mother's present age is 30. **Ans. 30**.

Q.8. If $BC = 10, CD = 16$ and distance AD is 26 . Find AB

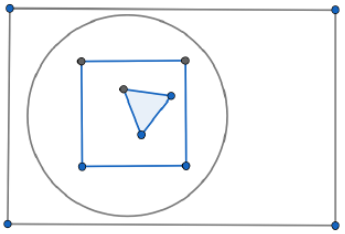


Solution: Extend line DC and let the $\perp$ from A on it be E. So, $\triangle AED$ is a right angled triangle in which $AE = BC = 10$ and $AD = 26$ Using Pythagoras theorem, we have $AD^2 = AE^2 + ED^2 \Rightarrow 26^2 = 10^2 + ED^2 \Rightarrow ED = 24 \Rightarrow AB = EC = ED - CD = 24 - 16 = 8$. **Ans. 8**.

Q.9. $\frac{1}{3}$ of the plot was bought by $A \cdot \frac{2}{5}$ of the remaining was bought by B.$\frac{1}{2}$ of remaining was baught by C and the remaining was bought by D. If D gets 19 acres, what is the size in acres did A and B together got?.

Solution: A buys $\frac{1}{3}$, so remaining is $\frac{2}{3}$. $\frac{2}{5}$ of it is $\frac{4}{15}$. So, total bought by A and B is $\frac{1}{3} + \frac{4}{15} = \frac{3}{5}$. Remaining is $\frac{2}{5}$. $\frac{1}{2}$ of it is $\frac{1}{5}$. So, total bought by A, B, C is $\frac{3}{5} + \frac{1}{5} = \frac{4}{5}$. So, remaining is $\frac{1}{5}$ which is 19. So, total plot is 95 acres. So, A, B together get $\frac{3}{5} \times 95 = 57$. **Ans. 57**.

Q.10. Area of circle is 50% of rectangle. Area of Square is 40% of circle. Area of triangle is 20% of square. Then area of triangle is what percentage of rectangle?



Solution: Area of triangle is 20% of 40% of 50% of the rectangle, i.e. $\frac{1}{5} \times \frac{2}{5} \times \frac{1}{2} = \frac{1}{25}$ times, i.e. 4%. **Ans. 4**.

Q.11. Fresh grapes have a moisture content of 80%. When left in sun to dry they loose 75% of their moistute content. Find the percentage of moisture content of dried grapes?

Solution: Suppose the total weight of grapes is 100 of which moisture is 80 and remaining is 20. 75% of 80 = 60 is lost. So, remaining moisture is 20. So, total remaining is $20 + 20 = 40$ and moisture is 20. So, answer is 50%. **Ans. 50**.

Q.12. If $3^{3x-2} = 9^2$, find x.

Solution: $3^{3x-2} = 9^2 = (3^2)^2 = 3^4 \Rightarrow 3x - 2 = 4 \Rightarrow x = 2$. **Ans. 2**.

Q.13. $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} - \frac{m}{n} = 2$. If m, n are positive and have nothing in common (coprimes), find $n - m$.

Solution: $1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} - \frac{m}{n} = 2 \Rightarrow 1 + \frac{1}{2} + \frac{1}{3} + \frac{1}{4} + \frac{1}{5} = \frac{m}{n} + 2$
$\Rightarrow \frac{60+30+20+15+12}{60} = \frac{m}{n} + 2 \Rightarrow \frac{137}{60} = \frac{m}{n} + 2 \Rightarrow \frac{m}{n} = \frac{137}{60} - 2 = \frac{17}{60} \Rightarrow n - m = 60 - 17 = 43$.
Ans. 43.

Q.14. Find $\frac{1}{K}$ if $\frac{2}{3}(1 - 133K) + \frac{3}{4}(1 + 133K) + \frac{4}{5}(1 - 133K) = 0$

Solution: Let $133K = x$. So, we have $\frac{2}{3}(1 - x) + \frac{3}{4}(1 + x) + \frac{4}{5}(1 - x) = 0$
$\Rightarrow \frac{2}{3} + \frac{3}{4} + \frac{4}{5} = x\left(\frac{2}{3} - \frac{3}{4} + \frac{4}{5}\right) \Rightarrow \frac{40+45+48}{60} = x\left(\frac{40-45+48}{60}\right) \Rightarrow \frac{133}{43} = 133K \Rightarrow \frac{1}{K} = 43$.
Ans. 43.

Q.15. Instead of multiplying a given number by $\frac{3}{5}$, a student divided it by $\frac{3}{5}$. His answer was 48 more than the correct answer. Then the given number was?

Solution: If the number is x, we get $\frac{x}{\frac{3}{5}} - x \times \frac{3}{5} = 48 \Rightarrow x\left(\frac{5}{3} - \frac{3}{5}\right) = 48 \Rightarrow x = 45$.

Ans. 45.

Q.16. Average of all exteriors angles of nine sides convex polygon is?

Solution: Since sum of exterior angles of any convex polygon is 360°, the average is $\frac{360}{9} = 40$. **Ans. 40**.

Q.17. If $\frac{2}{3}th$ of a book and 5 additional pages are read, 22 pages of the book are left to be read. How many pages does the book have?
Solution: So, if $\frac{2}{3}^{rd}$ of the book is read, then $5 + 22 = 27$ pages are left. So, $\frac{1}{3}$ of the book is 27 pages, so the book has $27 \times 3 = 81$ pages. **Ans. 81**.

Q.18. If area of the square is 578 , then diagonal of the square has length equal to
Solution: We know that if length of the side of a square is x then the diagonal is $x\sqrt{2}$ and area is x^2. Here, $x^2 = 578 \Rightarrow x = \sqrt{578} \Rightarrow x\sqrt{2} = \sqrt{578}\sqrt{2} = \sqrt{1156} = 34$.
Ans. 34.

Q.19. We define new arithmetic operation ' & ' as - a & b $= \frac{1}{a} + \frac{1}{b}$. Let $a = 4, b = 5$ and $c = 6$. Let $K = \dfrac{(a\&b)\&c}{(b\&c)}$. Find $\frac{33}{5}K$
Solution: $a\&b = \frac{1}{4}+\frac{1}{5} = \frac{9}{20}$. So, $(a\&b)\&c = \dfrac{1}{\frac{9}{20}}+\frac{1}{6} = \frac{20}{9}+\frac{1}{6} = \frac{43}{18}$. Also, $b\&c = \frac{1}{5}+\frac{1}{6} = \frac{11}{30}$.
So, $K = \dfrac{(a\&b)\&c}{(b\&c)} = \dfrac{\frac{43}{18}}{\frac{11}{30}} = \frac{43}{18} \times \frac{30}{11} = \frac{43\times5}{33} \Rightarrow \frac{33}{5}K = 43$. **Ans. 43**.

Q.20. $\frac{1}{3}^{rd}$ of $\frac{1}{3}^{rd}$ of $\frac{1}{3}^{rd}$ of $\frac{1}{3}^{rd}$ of $\frac{1}{3}^{rd}$ of M is $\frac{1}{3}$. How much is M.
Solution: $\frac{1}{3}^{rd}$ of $\frac{1}{3}^{rd}$ of $\frac{1}{3}^{rd}$ of $\frac{1}{3}^{rd}$ of $\frac{1}{3}^{rd}$ of $M = \frac{1}{3^5}M$. So, $\frac{1}{3^5}M = \frac{1}{3} \Rightarrow M = 3^4 = 81$.
Ans. 81.

Answer Key

Q.No.	1	2	3	4	5	6	7	8	9	10
Ans	60	79	16	54	29	27	30	8	57	4
Q.No.	11	12	13	14	15	16	17	18	19	20
Ans	50	2	43	43	45	40	81	34	43	81