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UNIFIED CYBER OLYMPIAD

Solutions for Sample Questions
class : 10

Mental Ability

1. **(C)** $h^2 = a^2 + b^2$, since, a and h are consecutive integers, $h = a + 1$

   $\Rightarrow (a + 1)^2 = a^2 + b^2$

   $\Rightarrow b^2 = 2a + 1$

   $\Rightarrow a = \dfrac{b^2 - 1}{2}$

   $\Rightarrow h = \dfrac{b^2 + 1}{2}$

   So, $sin\theta = \dfrac{a}{h} = \dfrac{b^2 - 1}{b^2 + 1}$

2. **(C)** The unit digit of each term successively 1, 9, 1, 9, 1, 9, ...

   The unit digit of sum of first two terms is 0.

   The unit digit of sum of first three terms is 1.

   The unit digit of sum of first four terms is 0.

   Hence, the digit in units place is 0 or 1 depending on number of terms i.e., even or odd respectively. So, the unit digit of the sum of 2009 terms is **1**.

3. **(D)** $36000 = \dfrac{40}{2}\{2a_1 + (40 - 1)d\}$

   $\Rightarrow 1800 = 2a_1 + 39d$ ..... (i)

   and $\dfrac{2}{3} \times 36000 = \dfrac{30}{2}\{2a_1 + (30 - 1)d\}$

   $\Rightarrow 1600 = 2a_1 + 29d$ ..... (ii)

   From (i) and (ii), $a_1 = 510$ d = 20.

   Value of 12th instalment = a_{12}

   $= 510 + (12 - 1) \times 20 = $ **730**

4. **(D)** α and β are the roots of $x^2 + px + 1 = 0$

   $\Rightarrow \alpha + \beta = -p,\ \alpha\beta = 1$

   γ and δ are the roots of $x^2 + qx + 1 = 0$

   $\Rightarrow \gamma\delta = 1$

$\gamma^2 + q\gamma + 1 = 0 \Rightarrow \gamma^2 + 1 = -q\gamma$

$\delta^2 + q\delta + 1 = 0 \Rightarrow \delta^2 + 1 = -q\delta$

$(\alpha - \gamma)(\beta - \gamma)(\alpha + \delta)(\beta + \delta)$

$= [\alpha\beta - \gamma(\alpha + \beta) + \gamma^2]\ [\alpha\beta + \delta(\alpha + \beta) + \delta^2]$

$= (1 + p\gamma + \gamma^2)(1 - p\delta + \delta^2)$

$= (p\gamma - q\gamma)(-p\delta - q\delta)$

$= -\gamma\delta(p - q)(p + q)$

$= -(p^2 - q^2) = $ **$q^2 - p^2$**

5. **(C)** Let the original sides be a, b, c, then

   $s = \dfrac{1}{2}(a + b + c)$

   and area of the triangle

   $= \sqrt{s(s - a)(s - b)(s - c)}$

   For the new triangle, the sides are 2a, 2b, 2c

   Then, $S = \dfrac{1}{2}(2a + 2b + 2c)$

   $= a + b + c = 2s$

   $\therefore$ Area of new triangle

   $= \sqrt{S(S - 2a)(S - 2b)(S - 2c)}$

   $= \sqrt{2s(2s - 2a)(2s - 2b)(2s - 2c)}$
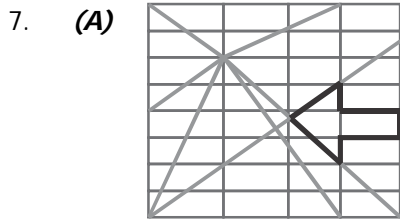
   $= \sqrt{16s(s - a)(s - b)(s - c)}$

   $= 4\sqrt{s(s - a)(s - b)(s - c)}$

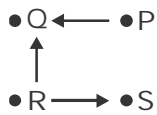 $= 4 \times$ (area of original triangle)

   $\therefore$ Area becomes **4 times** of original area.

Reasoning

6. **(C)** Draw a vertical line at the centre in each figure. Turn the book 90° clockwise, the figures are water images of the letters I, J, K, L and M. Hence the next one is **N**.

7. **(A)**

8. **(B)** According to P ÷ Q + R − S

●Q ◄——— ●P

↑

●R ——► ●S

∴ S is in the **South-east** of Q.

9. **(C)** C R E A T I V E
3 18 5 1 20 9 22 5

Hence, **3 pairs** are possible.

10. **(B)** A and B are children of D.

From 1: C is the brother B and son of E.

Since, the sex of D and E are not known. Hence, 1 is not sufficient to answer the question.

From 2: F is the mother of B. Hence, F is also the mother of A. Hence, D is the father of A. Thus, 2 is sufficient to answer the question.

Computers

11. **(A)** **Bluetooth** is a wireless technology built in electronic gadgets used for exchanging data over short distances.

12. **(C)** Verification of login name and password is known as **authentication**.

13. **(D)** **Cache memory** has the shortest access time.

14. **(B)** The collection of user messages on various subjects that are posted on world wide network is called **usenet**.

15. **(C)** JPEG stands for "**Joint Photographic Experts Group**".

English

16. **(A)** Having **ornithophobia**, vivek does not like birds.

17. **(C)** He said that **_he had been studying_** since morning.

18. **(D)** Allegiance means **Loyalty**.

19. **(A)** The correct spelling of Sarcofhagus is **Sarcophagus**.

20. **(B)** Dog in the manger