Q:1 Let x = $27^{1/6} - \sqrt{6\frac{3}{4}}$ and y = $\frac{\sqrt{45}+\sqrt{605}+\sqrt{245}}{\sqrt{80}+\sqrt{125}}$, then the value of $x^2 + y^2$ is?
1. 221/9
2. 227/9
3. 221/36
4. 223/36

Q:2 If $ab + c(a + b) = 31$, $(a + b + c) = 10$, $abc = 30$ and $a^3 + b^3 + c^3 = 160$, then find the value of $(a^2 + b^2 + c^2) \div (a + b + c)$.
1. 3.8
2. 1.6
3. 3.2
4. 4

Q:3 If $x + y + z = 19$ & $x^2 + y^2 + z^2 = 133$, then the value of $x^3 + y^3 + z^3 - 3xyz$ is:
1. 380
2. 352
3. 361
4. 342

Q:4 Find the value of $(25^3 - 11^3 - 14^3)/(25 + 11 + 14)$.
1. 231
2. 1050
3. 462
4. 221

Q:5 If $a^2 + b^2 = 50$ & $ab = 7$, then find the value of $(a^4 - b^4)/(a + b)$.
1. 300
2. 280
3. 225
4. 150

Q:6 If $x = 2 + \sqrt{3}$ then, the value of $x^3 + 1/x^3$ is:
1. $52\sqrt{3}$
2. 52
3. $-52\sqrt{3}$
4. -52

Q:7 If a = 85, b = 89 and c = 91, then find the value of $[a^3 + b^3 + c^3 - 3abc]$.
1. 9536
2. 8452
3. 5842
4. 7420

Q:8 The sum of a two-digit number and the number obtained by reversing its digits is 121. Find the number if its unit place digit is 5.
1. 45
2. 55
3. 60
4. 65

Q:9 If $y^2 + 9x^2 = 12$ and $yx = 6$ then, find the value of $(y + 3x)^3/4\sqrt{3}$.
1. 32
2. 46
3. 48
4. 54

Q:10 If one number is 12, four times the difference between 12 and the other number is equal to double their sum, the other number is smaller than 12. Find the other number.
1. 10
2. 8
3. 4
4. 2

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Answer Key

1. (4)	**2.** (1)	**3.** (3)	**4.** (1)	**5.** (1)
6. (2)	**7.** (4)	**8.** (4)	**9.** (3)	**10.** (3)

Answers and Solutions

Q:1 The correct answer is **option 4** i.e. **223/36**

$x = 27^{1/6} - \sqrt{6\frac{3}{4}}$

$= \sqrt{3} - \sqrt{\frac{27}{4}}$

$= \sqrt{3} - \frac{3}{2}\sqrt{3}$

$= \frac{-\sqrt{3}}{2}$

$x^2 = 3/4$

$y = \frac{\sqrt{45}+\sqrt{605}+\sqrt{245}}{\sqrt{80}+\sqrt{125}}$

$y = \frac{3\sqrt{5}+11\sqrt{5}+7\sqrt{5}}{4\sqrt{5}+5\sqrt{5}}$

$y = \frac{21\sqrt{5}}{\frac{9}{5}}$

$y^2 = 2205/405 = 49/9$

Now, $x^2 + y^2 = 3/4 + 49/9 = (196 + 27)/36 = 223/36$

Q:2 The correct answer is **option 1** i.e. **3.8.**

Given:

$ab + c(a + b) = 31$, $(a + b + c) = 10$, $abc = 30$ and $a^3 + b^3 + c^3 = 160$

Formula used:

$a^3 + b^3 + c^3 - 3abc = (a + b + c)(a^2 + b^2 + c^2 - ab - bc - ca)$ ----- (1)

Calculations:

Let $a^2 + b^2 + c^2$ be x.

$\Rightarrow ab + c(a + b) = 31$

can be written as

$\Rightarrow ab + bc + ca = 31$

Using equation (1), we get

$\Rightarrow 160 - 3 \times 30 = (10)(x - 31)$

$\Rightarrow 160 - 90 = 10(x - 31)$

$\Rightarrow 70 = 10(x - 31)$

$\Rightarrow x - 31 = 7$

$\Rightarrow x = 38$

Required value = $(a^2 + b^2 + c^2) \div (a + b + c)$.

$\Rightarrow 38/10 = 3.8$

Q:3 The correct answer is **Option 3** i.e. **361.**

Given:

$\Rightarrow (x + y + z) = 19$, $(x^2 + y^2 + z^2) = 133$

Now,

$\Rightarrow (x + y + z) = 19$

Squaring both sides:

$\Rightarrow (x + y + z)^2 = 19^2$

$\Rightarrow x^2 + y^2 + z^2 + 2(xy + yz + zx) = 361$

$\Rightarrow 2(xy + yz + zx) = 361 - 133$

$\Rightarrow 2(xy + yz + zx) = 228$

$\Rightarrow (xy + yz + zx) = 114$

Now,

$\Rightarrow x^3 + y^3 + z^3 - 3xyz$

$\Rightarrow (x + y + z)(x^2 + y^2 + z^2 - xy - yz - zx)$

$\Rightarrow 19 \times (133 - 114) = (19 \times 19) = 361$

Q:4 The correct answer is **Option 1** i.e. **231.**

Concept used:

When $a + b + c = 0$ then, $a^3 + b^3 + c^3 = 3abc$ ---- (1)

Calculations:

Taking the numerator, we can see that

$\Rightarrow (25^3 - 11^3 - 14^3)$, $a = 25$, $b = -11$ and $c = -14$

$\Rightarrow 25 - 11 - 14 = 0$

Now, using equation (1), we get

$\Rightarrow (25^3 - 11^3 - 14^3)/(25 + 11 + 14)$

$\Rightarrow (3 \times 25 \times 11 \times 14)/50$

$\Rightarrow 11550/50 = 231$

Q:5 The correct answer is **Option 1** i.e. **300.**

Given:

$a^2 + b^2 = 50$ & $ab = 7$

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

$\Rightarrow a^4 - b^4 = (a^2 + b^2)(a^2 - b^2)$

$\Rightarrow a^2 + b^2 = (a - b)^2 + 2ab$

Now, Putting the given values

$\Rightarrow 50 - 14 = (a - b)^2$

$\Rightarrow (a - b) = 6$

Now, The value of $(a^4 - b^4)/(a + b)$

$\Rightarrow \{(a^2 + b^2)(a - b)(a + b)\}/(a + b)$

$\Rightarrow (a^2 + b^2)(a - b)$

$\Rightarrow 50 \times 6 = 300$

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Q:6 The correct answer is **Option 2** i.e. **52.**
If $x + 1/x = a$ then, $x^3 + 1/x^3 = a^3 - 3a$
Given:
$\Rightarrow x = 2 + \sqrt{3}$
Then,
$\Rightarrow 1/x = 2 - \sqrt{3}$
Now,
$\Rightarrow x + 1/x = 2 + \sqrt{3} + 2 - \sqrt{3}$
$\Rightarrow x + 1/x = 4$
So, the value of $x^3 + 1/x^3$
$\Rightarrow 4^3 - 3 \times 4 = 64 - 12 = 52$

Q:7 The correct answer is **Option 4** i.e. **7420.**
$[a^3 + b^3 + c^3 - 3abc] = 1/2\ (a + b + c)\ [(a - b)^2 + (b - c)^2 + (c - a)^2]$
Given,
$a = 85$, $b = 89$ and $c = 91$
So,
$(a + b + c) = 265$
$\Rightarrow (a - b)^2 = 16$
$\Rightarrow (b - c)^2 = 4$
$\Rightarrow (c - a)^2 = 36$
Now,
$[a^3 + b^3 + c^3 - 3abc]$
$\Rightarrow 1/2 \times (265) \times [16 + 4 + 36]$
$\Rightarrow 265 \times 28 = 7420$

Q:8 The correct answer is **Option 4** i.e. **65.**
The unit place digit is given as 5
Let x be the tens place digit
Number formed = $5 + 10x$
Number obtained by reversing the digits = $5 \times 10 + x = 50 + x$
As per the question, we have
$5 + 10x + 50 + x = 121$
$\Rightarrow 11x + 55 = 121$
$\Rightarrow 11x = 121 - 55$
$\Rightarrow x = 6$
Hence, the required number = $5 + 6 \times 10 = 5 + 60 = 65$

Q:9 The correct answer is **Option 3** i.e. **48.**
$\Rightarrow (y + 3x)^2 = y^2 + 9x^2 + 6yx$
$\Rightarrow (y + 3x)^2 = 12 + 6 \times 6$
$\Rightarrow (y + 3x)^2 = 12 + 36 = 48$
$\Rightarrow (y + 3x)^2 = 48$
$\Rightarrow (y + 3x) = \sqrt{48}$
To find:- $(y + 3x)^3/4\sqrt{3} = (4\sqrt{3})^3/4\sqrt{3} = 48$

Q:10 The correct answer is **Option 3** i.e. **4.**
One number = 12
Let the other number be x
Four times the difference between two numbers is equal to double their sum
ATQ -
$\Rightarrow 4(12 - x) = 2(12 + x)$
$\Rightarrow 48 - 4x = 24 + 2x$
$\Rightarrow 24 = 2x + 4x$
$\Rightarrow 6x = 24$
$\Rightarrow x = 4$

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