

Equations & Algebra	Slot 1	Slot 2	Slot 3	Slot 4	Slot 5	Slot 6	Total	Average
Algebraic Identities			1			4	5	1
Linear Equations	3	3	4	6	2	5	23	4
Polynomials		1			2		3	1
Quadratic Equations	1				1		2	0.33
Surds and Indices		2		1			3	0.50
Grand Total	4	6	5	7	5	9	36	6.00

- One year payment to an assistant is 120 and one gold coin. The assistant leaves after 8 months and receives 70 and a gold coin. Determine the value of the gold coin.
A) 20
B) 30
C) 40
D) 50
E) 60
- Five years ago, A was 10 years older than B. If A is currently twice as old as B, what is the sum of their current ages?
A) 20
B) 30
C) 40
D) 50
E) 60
- The sum of ages of 6 children born at intervals of 2 years each is 66 years. What is the age of the oldest child?
A) 16
B) 14
C) 12
D) 18
E) 20
- How many positive integer solutions exist for the equation $2x + 3y = 15$?
A) 1
B) 3
C) 2
D) 4
E) 0
- If the sum of two numbers is 25 and their difference is 7, find the difference between their squares.
A) 150
B) 175
C) 200
D) 225
E) 250
- Find the value of 198^2 .
A) 39404
B) 39904
C) 39204
D) 40202
E) 41204

7. Find x if $2^{(x+3)} - 2^x = 112$.

- A) 3
- B) 2
- C) 5
- D) 4
- E) 7

8. If $x + 1/x = 2$, find the value of $x^2 + 1/x^2$.

- A) 1
- B) 2
- C) 4
- D) 6
- E) 8

9. Expand the following expression: $(4p + 3q)^2 + (2r - 5s)^2$

- A) $16p^2 + 9q^2 + 4r^2 + 4s^2 + 24pq - 20rs$
- B) $16p^2 + 24pq + 9q^2 + 4r^2 - 20rs + 25s^2$
- C) $16p^2 + 12pq + 6q^2 + 4r^2 - 10rs + 25s^2$
- D) $8p^2 + 24pq + 9q^2 + 4r^2 - 20rs + 10s^2$
- E) $16p^2 + 24pq + 9q^2 + 25r^2 + 20rs + 25s^2$

Solutions

1. B) 30: Total yearly = 120 + coin; for 8 months $\rightarrow (2/3)(120 + \text{coin}) = 70 + \text{coin} \rightarrow \text{coin} = 30$.
2. B) 30: Let $B=x$, $A=2x$; 5 years ago $\rightarrow (2x-5) = (x-5)+10 \rightarrow x=10 \rightarrow \text{sum} = 30$.
3. A) 16: $x, x+2, \dots, x+10$; sum = $6x+30 = 66 \rightarrow x=6 \rightarrow \text{oldest} = 16$
4. C) 2: $2x+3y=15 \rightarrow$ If $y = 1$, $x = 6$ (Valid) If $y = 3$, $x = 3$ (Valid) \rightarrow total 2 solutions.
5. B) 175: $(a^2-b^2) = (a+b)(a-b) = 25 \times 7 = 175$.
6. C) 39204: $(200-2)^2 = 40000 - 800 + 4 = 39204$.
7. D) 4: $2^{(x+3)} = 8 \cdot 2^x \rightarrow 7 \cdot 2^x = 112 \rightarrow 2^x = 16 \rightarrow x = 4$.
8. B) 2: $(x + 1/x)^2 = x^2 + 1/x^2 + 2 \rightarrow 4 = x^2 + 1/x^2 + 2 \rightarrow x^2 + 1/x^2 = 2$.
9. B) $16p^2 + 24pq + 9q^2 + 4r^2 - 20rs + 25s^2$: Use $(a+b)^2 = a^2 + b^2 + 2ab$ and $(a-b)^2 = a^2 + b^2 - 2ab \rightarrow$ combine both expansions.