Algebra & Sequences: Hard Practice Paper 7 Answers

Q#	Answer	Explanation
1	C	The gaps grow, so compare the sequence with the square numbers 1, 4, 9, 16, 25. Every term sits one below a square number, so the nth term is $n^2 - 1$. For the 8th term, $8 \times 8 = 64$, and then $64 - 1 = 63$.
2	C	Take 5 from both sides first, leaving $2x \div 3 = 8$. Multiply both sides by 3 to undo the division, giving $2x = 24$. Then divide by 2, so $x = 12$.
3	B	Both orders contain two pens, so the difference between them buys the two extra notebooks. That difference is $11 - 7 = 4$ pounds, so one notebook costs $4 \div 2 = 2$ pounds.
4	D	Do the bracket first. Subtracting a negative is the same as adding, so $a - b$ gives $3 + 2 = 5$. Squaring that gives $5 \times 5 = 25$.
5	E	An odd number added to an even number always leaves an odd total, so $p + q$ is odd. Anything multiplied by an even number is even, which rules out pq and $pq + q$, and adding a number to itself doubles it, so $p + p$ and $q + q$ are even as well.
6	B	A term stays positive while $6n$ is smaller than 200. Since $6 \times 33 = 198$, the 33rd term is $200 - 198 = 2$, which is still positive. But $6 \times 34 = 204$ is more than 200, so the 34th term has gone negative. That makes 33 positive terms.
7	B	The 4th and 5th terms add to make the 6th, so the 4th term is $54 - 33 = 21$. In the same way the 3rd and 4th terms add to make the 5th, so the 3rd term is $33 - 21 = 12$.
8	A	The first bracket expands to $12x + 18$. The minus sign in front of the second bracket changes both of its signs, so it contributes $-4x + 5$. Collecting up, $12x - 4x$ leaves $8x$, and $18 + 5 = 23$, giving $8x + 23$.

9	C	Call the width w cm, so the length is w + 3 cm. One length and one width together come to 2w + 3, and the perimeter is double that, so 4w + 6 = 38. Taking 6 from both sides gives 4w = 32, so w = 8 and the length is 8 + 3 = 11. The area is 11 × 8 = 88 cm².
10	C	The sequence falls by 16, then 15, then 14, then 13, so each fall is one smaller than the last. The next fall is 12, giving 42 − 12 = 30.
11	C	Put b = 7 into the equation. Since 2 × 7 = 14, it becomes 5a − 14 = 26. Add 14 to both sides to get 5a = 40, so a = 8.
12	C	Call the brother's age b, so Sara is 3b. In 4 years they will be b + 4 and 3b + 4, and Sara will be twice her brother's age, so 3b + 4 must equal 2b + 8. Taking 2b from both sides leaves b + 4 equal to 8, so b = 4 and Sara is 3 × 4 = 12. Checking: in 4 years they will be 8 and 16.
13	C	8 × 8 = 64, so 64 is a square number, and 4 × 4 × 4 = 64, so it is a cube number as well. Of the others, 16, 36 and 81 are squares only, and 125 is a cube only.
14	B	From the 3rd term to the 8th there are 5 steps, and the sequence rises by 44 − 14 = 30 across them, so each step is 30 ÷ 5 = 6. Going back two steps from the 3rd term gives 14 − 2 × 6 = 2.
15	C	Call the number n. Doubling and adding 7 gives 2n + 7, and three times the number less 2 gives 3n − 2, and these are equal. Taking 2n from both sides leaves 7 equal to n − 2, so n = 9. Checking: 18 + 7 = 25 and 27 − 2 = 25.

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