Number Properties: Medium Practice Paper 9 Answers

Q#	Answer	Explanation
1	D	Double each number and see whether the answer is a square. Doubling 8 gives 16, and 4 × 4 = 16, so 8 works. Doubling the others gives 18, 24, 32 and 40, and none of those is a square number. Notice that 9 and 16 are squares themselves, but their doubles are not.
2	E	Carry on the triangular numbers by adding 6, then 7, then 8, then 9: they are 21, 28, 36 and 45. 36 is in the list, and 6 × 6 = 36, so it is square as well. 15 and 45 are triangular but not square, and 25 and 49 are square but not triangular.
3	C	3 + 17 = 20, and 3 and 17 are both prime. Every other pair adds to 20 but contains a number that is not prime: 9 is 3 × 3, 15 is 3 × 5, 18 is even, and 1 is not prime because it has only one factor.
4	E	List the square numbers and look at the gaps: 25, 36, 49, 64, 81. The gaps are 11, 13, 15 and 17, going up by 2 each time. The gap of 15 is 64 − 49 = 15, so the larger square number is 64.
5	B	Every factor is made by multiplying some of the prime factors together. 6 is 2 × 3, 12 is 2 × 2 × 3, 14 is 2 × 7 and 21 is 3 × 7. But 9 is 3 × 3, and the number has only one 3, so 9 is not a factor. The number is 2 × 2 × 3 × 7 = 84, and 84 cannot be divided exactly by 9.
6	E	Two odd numbers always add to make an even number. For the answer to be odd, one number must be even and the other odd. The only even prime number is 2, so one of the primes must be 2. For example, 2 + 11 = 13.
7	A	A number that is a multiple of both 3 and 5 is a multiple of 15. The two-digit multiples of 15 are 15, 30, 45, 60, 75 and 90. That is 6 numbers. The next one, 105, has three digits.
8	E	Try a number that leaves remainder 3, such as 7. Doubling it gives 14, and 14 is 2 more than 12, which is a multiple of 4, so the remainder is 2. It works every time: 11 doubles to 22, which is 2 more than 20. Doubling the remainder gives 6, but 6 contains another whole 4, leaving 2.

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9	C	12 is a multiple of 4 because 3 × 4 = 12, and it is a factor of 36 because 3 × 12 = 36. 8 and 16 are multiples of 4 but do not divide exactly into 36. 9 and 18 are factors of 36 but are not multiples of 4.
10	C	Only the last digits matter. 7 × 7 = 49, which ends in 9. Multiplying by 7 again, 9 × 7 = 63, which ends in 3. Multiplying by 7 once more, 3 × 7 = 21, which ends in 1. The full answer is 2,401.
11	D	The totals are square numbers: three odd numbers give 3 × 3 = 9 and four give 4 × 4 = 16. So eight odd numbers give 8 × 8 = 64. Check: 1 + 3 + 5 + 7 + 9 + 11 + 13 + 15 = 64.
12	B	Both numbers must be prime. 17 and 19 are both prime and 19 − 17 = 2. In each of the other pairs the second number is not prime: 9 is 3 × 3, 15 is 3 × 5, 21 is 3 × 7 and 25 is 5 × 5.
13	E	A multiple of both 6 and 8 is a multiple of 24, their lowest common multiple. The multiples of 24 are 24, 48, 72, 96, 120, ... The first one with three digits is 120. 144 is a multiple of both as well, but it is not the smallest. 102 and 108 are multiples of 6 only, and 104 is a multiple of 8 only.
14	C	Next year's age ends in 0 or 5, so this year's age ends in 9 or 4. A multiple of 4 cannot end in 9, because it is even. The only multiple of 4 between 10 and 30 that ends in 4 is 24, and 24 + 1 = 25, which is a multiple of 5.
15	E	A number is divisible by 3 when its digits add up to a multiple of 3, and by 9 when they add up to a multiple of 9. The known digits add up to 5 + 6 = 11. With 4 the total is 15, a multiple of 3 but not of 9. With 7 the total is 18, which is a multiple of 9. With 0, 2 or 9 the totals are 11, 13 and 20, which are not multiples of 3.

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