

Number Properties: Hard Practice Paper 8 Answers

Q#	Answer	Explanation
1	D	Write each as prime factors: 150 is $2 \times 3 \times 5 \times 5$ and 225 is $3 \times 3 \times 5 \times 5$. The primes they share are 3, 5 and 5, and $3 \times 5 \times 5 = 75$.
2	C	The 16 needs four 2s and the 20 needs two 2s and a 5, so four 2s and one 5 cover both. That gives $16 \times 5 = 80$, and $80 \div 20 = 4$ shows it works for 20 as well.
3	D	Pair them up: 1 with 144, 2 with 72, 3 with 48, 4 with 36, 6 with 24, 8 with 18 and 9 with 16. That is 14 factors, and then 12 pairs with itself, making 15 – an odd number, because 144 is a square.
4	B	Factors pair up, so a number has an odd number of factors only when it is a square, because then its square root pairs with itself. Only q has an odd count, so q must be a square number.
5	C	Count up in sevens near 100: $7 \times 14 = 98$, which is still two digits, and $7 \times 15 = 105$. So 105 is the smallest three-digit multiple of 7.
6	C	Undo the subtraction first: $76 + 5 = 81$. The number is then the square root of 81, and $9 \times 9 = 81$, so the number is 9.
7	D	Everything inside either circle counts. Add the three regions: 17 that are only even, 8 that are both, and 8 that are only multiples of 3, giving $17 + 8 + 8 = 33$ numbers.
8	A	The number 2 is both even and prime, so it is not true that every prime is odd. The other four statements are all correct.
9	C	Break 66 down: $66 \div 2 = 33$, and $33 \div 3 = 11$, which is prime. The prime factors are 2, 3 and 11, and $2 + 3 + 11 = 16$.
10	B	The marks meet again once a number of teeth has passed that suits both cogs, which is the lowest common multiple of 15 and 20, namely 60. The smaller cog has 15 teeth, so it turns $60 \div 15 = 4$ times.

11	E	Having exactly two factors means being prime. The primes up to 100 begin 2, 3, 5, 7, 11 and end at 97, and there are 25 of them altogether.
12	A	Both parts have to be square. Working through the squares below 100, $100 - 36 = 64$, and 36 is 6×6 while 64 is 8×8 . In every other pair the second number is not a square.
13	B	30 breaks down into $2 \times 3 \times 5$, which is three different primes. The others repeat a prime: 27 is $3 \times 3 \times 3$, 45 is $3 \times 3 \times 5$, 49 is 7×7 and 64 is made only of 2s.
14	C	A number that divides by both must be a multiple of 72, and $72 \times 2 = 144$. Check: $144 \div 8 = 18$ and $144 \div 9 = 16$. Each of the others divides by one of them but not the other.
15	D	Take away the 2 spare counters and what is left must divide by 4, 5 and 6. The smallest such number is their lowest common multiple, 60, so the pile holds $60 + 2 = 62$ counters.