(1) This indicates that 280 of the 400 numbers in the list are less than the average of the 400 numbers. This means that both the 200th and the 201st numbers, as well as the median, are less than the average and, therefore, that the average is greater than the median; SUFFICIENT.

(2) This indicates that (0.3)(400) = 120 of the numbers are greater than or equal to the average. This means that the other 400 – 120 = 280 numbers are less than the average, which is the same as the information in (1); SUFFICIENT.

The correct answer is D;
each statement alone is sufficient.

DS03678

246. In a two-month survey of shoppers, each shopper bought one of two brands of detergent, X or Y, in the first month and again bought one of these brands in the second month. In the survey, 90 percent of the shoppers who bought Brand X in the first month bought Brand X again in the second month, while 60 percent of the shoppers who bought Brand Y in the first month bought Brand Y again in the second month. What percent of the shoppers bought Brand Y in the second month?

(1) In the first month, 50 percent of the shoppers bought Brand X.

(2) The total number of shoppers surveyed was 5,000.

Arithmetic Percents

This problem can be solved by using the following contingency table where A and B represent, respectively, the number of shoppers who bought Brand X and the number of shoppers who bought Brand Y in the first month; C and D represent, respectively, the number of shoppers who bought Brand X and the number of shoppers who bought Brand Y in the second month; and T represents the total number of shoppers in the survey. Also in the table, $0.9A$ represents the 90% of the shoppers who bought Brand X in the first month and also bought it in the second month, and $0.1A$ represents the (100 – 90)% = 10% of the shoppers who bought Brand X in the first month and Brand Y in the second month. Similarly, $0.6B$ represents the 60% of the shoppers who bought Brand Y in the first month and also bought it in the second month, and $0.4B$ represents the (100 – 60)% = 40% of the shoppers who bought Brand Y in the first month and Brand X in the second month.

		Second Month		
		X	Y	Total
First Month	X	$0.9A$	$0.1A$	A
	Y	$0.4B$	$0.6B$	B
	Total	C	D	T

Determine the value of $\frac{D}{T}$ as a percentage.

(1) This indicates that 50% of the shoppers bought Brand X in the first month, so $A = 0.5T$. It follows that the other 50% of the shoppers bought Brand Y in the first month, so $B = 0.5T$. Then, $D = 0.1A + 0.6B = 0.1(0.5T) + 0.6(0.5T) = 0.05T + 0.30T = 0.35T$. It follows that $\frac{D}{T} = \frac{0.35T}{T} = 0.35$, which is 35%; SUFFICIENT.

(2) This indicates that $T = 5{,}000$, as shown in the following table:

		Second Month		
		X	Y	Total
First Month	X	$0.9A$	$0.1A$	A
	Y	$0.4B$	$0.6B$	B
	Total	C	D	5,000

But not enough information is given to be able to determine D or D as a percentage of 5,000; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS15902

247. If m and n are positive integers, is $m + n$ divisible by 4 ?

(1) m and n are each divisible by 2.

(2) Neither m nor n is divisible by 4.

Arithmetic Properties of numbers

Determine whether the sum of the positive integers m and n is divisible by 4.

(1) It is given that m is divisible by 2 and n is divisible by 2. If, for example, $m = 2$ and $n = 2$, then each of m and n is divisible by 2 and $m + n = 2 + 2 = 4$, which is divisible by 4.

However, if $m = 2$ and $n = 4$, then each of m and n is divisible by 2 and $m + n = 2 + 4 = 6$, which is not divisible by 4; NOT sufficient.

(2) It is given that neither m nor n is divisible by 4. If, for example, $m = 3$ and $n = 5$, then neither m nor n is divisible by 4 and $m + n = 3 + 5 = 8$, which is divisible by 4. On the other hand, if $m = 3$ and $n = 6$, then neither m nor n is divisible by 4 and $m + n = 3 + 6 = 9$, which is not divisible by 4; NOT sufficient.

Taking (1) and (2) together, m is not divisible by 4, so $m = 4q + r$, where q is a positive integer and $0 < r < 4$. However, m is divisible by 2, so r must be even. Since the only positive even integer less than 4 is 2, then $r = 2$ and $m = 4q + 2$. Similarly, since n is divisible by 2 but not by 4, $n = 4s + 2$. It follows that $m + n = (4q + 2) + (4s + 2) = 4q + 4s + 4 = 4(q + s + 1)$, and $m + n$ is divisible by 4.

The correct answer is C;
both statements together are sufficient.

DS02940

248. What is the area of rectangular region R?

(1) Each diagonal of R has length 5.

(2) The perimeter of R is 14.

Geometry Rectangles

Let L and W be the length and width of the rectangle, respectively. Determine the value of LW.

(1) It is given that a diagonal's length is 5. Thus, by the Pythagorean theorem, it follows that $L^2 + W^2 = 5^2 = 25$. The value of LW cannot be determined, however, because $L = \sqrt{15}$ and $W = \sqrt{10}$ satisfy $L^2 + W^2 = 25$ with $LW = \sqrt{150}$, and $L = \sqrt{5}$ and $W = \sqrt{20}$ satisfy $L^2 + W^2 = 25$ with $LW = \sqrt{100}$; NOT sufficient.

(2) It is given that $2L + 2W = 14$, or $L + W = 7$, or $L = 7 - W$. Therefore, $LW = (7 - W)W$, which can vary in value. For example, if $L = 3$ and $W = 4$, then $L + W = 7$ and $LW = 12$. However, if $L = 2$ and $W = 5$, then $L + W = 7$ and $LW = 10$; NOT sufficient.

Given (1) and (2) together, it follows from (2) that $(L + W)^2 = 7^2 = 49$, or $L^2 + W^2 + 2LW = 49$. Using (1), 25 can be substituted for $L^2 + W^2$ to obtain $25 + 2LW = 49$, or $2LW = 24$, or $LW = 12$. Alternatively, $7 - W$ can be substituted for L in $L^2 + W^2 = 25$ to obtain the quadratic equation $(7 - W)^2 + W^2 = 25$, or $49 - 14W + W^2 + W^2 = 25$, or $2W^2 - 14W + 24 = 0$, or $W^2 - 7W + 12 = 0$. The left side of the last equation can be factored to give $(W - 4)(W - 3) = 0$. Therefore, $W = 4$, which gives $L = 7 - W = 7 - 4 = 3$ and $LW = (3)(4) = 12$, or $W = 3$, which gives $L = 7 - W = 7 - 3 = 4$ and $LW = (4)(3) = 12$. Since $LW = 12$ in either case, a unique value for LW can be determined.

The correct answer is C;
both statements together are sufficient.

DS17137

249. How many integers n are there such that $r < n < s$?

(1) $s - r = 5$

(2) r and s are not integers.

Arithmetic Properties of numbers

(1) The difference between s and r is 5. If r and s are integers (e.g., 7 and 12), the number of integers between them (i.e., n could be 8, 9, 10, or 11) is 4. If r and s are not integers (e.g., 6.5 and 11.5), then the number of integers between them (i.e., n could be 7, 8, 9, 10, or 11) is 5. No information is given that allows a determination of whether s and r are integers; NOT sufficient.

(2) No information is given about the difference between r and s. If $r = 0.4$ and $s = 0.5$, then r and s have no integers between them. However, if $r = 0.4$ and $s = 3.5$, then r and s have 3 integers between them; NOT sufficient.

Using the information from both (1) and (2), it can be determined that, because r and s are not integers, there are 5 integers between them.

The correct answer is C;
both statements together are sufficient.

DS17147

250. If the total price of n equally priced shares of a certain stock was \$12,000, what was the price per share of the stock?

(1) If the price per share of the stock had been \$1 more, the total price of the n shares would have been \$300 more.

(2) If the price per share of the stock had been \$2 less, the total price of the n shares would have been 5 percent less.

Arithmetic Arithmetic operations; Percents

Since the price per share of the stock can be expressed as $\frac{\$12,000}{n}$, determining the value of n is sufficient to answer this question.

(1) A per-share increase of \$1 and a total increase of \$300 for n shares of stock mean together that $n(\$1) = \$300$. It follows that $n = 300$; SUFFICIENT.

(2) If the price of each of the n shares had been reduced by \$2, the total reduction in price would have been 5 percent less or 0.05(\$12,000). The equation $2n = 0.05(\$12,000)$ expresses this relationship. The value of n can be determined to be 300 from this equation; SUFFICIENT.

The correct answer is D;
each statement alone is sufficient.

DS02865

251. If n is positive, is $\sqrt{n} > 100$?

(1) $\sqrt{n-1} > 99$

(2) $\sqrt{n+1} > 101$

Algebra Radicals

Determine if $\sqrt{n} > 100$ or equivalently, if $n > (100)(100) = 10,000$.

(1) Given that $\sqrt{n-1} > 99$, or equivalently, $n - 1 > (99)(99)$, it follows from

$$\begin{aligned}(99)(99) &= 99(100-1)\\ &= 9,900-99\\ &= 9,801\end{aligned}$$

that $\sqrt{n-1} > 99$ is equivalent to $n - 1 > 9,801$, or $n > 9,802$. Since $n > 9,802$ allows for values of n that are greater than 10,000 and $n > 9,802$ allows for values of n that are not greater than 10,000, it cannot be determined if $n > 10,000$; NOT sufficient.

(2) Given that $\sqrt{n+1} > 101$, or equivalently, $n + 1 > (101)(101)$, it follows from

$$\begin{aligned}(101)(101) &= 101(100+1)\\ &= 10,100+101\\ &= 10,201\end{aligned}$$

that $\sqrt{n+1} > 101$ is equivalent to $n + 1 > 10,201$, or $n > 10,200$. Since $10,200 > 10,000$, it can be determined that $n > 10,000$; SUFFICIENT.

The correct answer is B;
statement 2 alone is sufficient.

DS17150

252. Is $xy > 5$?

(1) $1 \le x \le 3$ and $2 \le y \le 4$.

(2) $x + y = 5$

Algebra Inequalities

(1) While it is known that $1 \le x \le 3$ and $2 \le y \le 4$, xy could be $(3)(4) = 12$, which is greater than 5, or xy could be $(1)(2) = 2$, which is not greater than 5; NOT sufficient.

(2) Given that $x + y = 5$, xy could be 6 (when $x = 2$ and $y = 3$), which is greater than 5, and xy could be 4 (when $x = 1$ and $y = 4$), which is not greater than 5; NOT sufficient.

Both (1) and (2) together are not sufficient since the two examples given in (2) are consistent with both statements.

The correct answer is E;
both statements together are still not sufficient.

DS17151

253. In Year X, 8.7 percent of the men in the labor force were unemployed in June compared with 8.4 percent in May. If the number of men in the labor force was the same for both months, how many men were unemployed in June of that year?

(1) In May of Year X, the number of unemployed men in the labor force was 3.36 million.

(2) In Year X, 120,000 more men in the labor force were unemployed in June than in May.

Arithmetic Percents

Since 8.7 percent of the men in the labor force were unemployed in June, the number of unemployed men could be calculated if the total number of men in the labor force was known. Let t represent the total number of men in the labor force.

(1) This implies that for May $(8.4\%)t = 3,360,000$, from which the value of t can be determined; SUFFICIENT.

(2) This implies that $(8.7\% - 8.4\%)t = 120{,}000$ or $(0.3\%)t = 120{,}000$. This equation can be solved for t; SUFFICIENT.

The correct answer is D;
each statement alone is sufficient.

DS17112

254. If $x \neq 0$, what is the value of $\left(\frac{x^p}{x^q}\right)^4$?

(1) $p = q$

(2) $x = 3$

Arithmetic; Algebra Arithmetic operations; Simplifying expressions

(1) Since $p = q$, it follows that $\left(\frac{x^p}{x^q}\right)^4 = \left(\frac{x^p}{x^p}\right)^4 = (1)^4$; SUFFICIENT.

(2) Since $x = 3$ (and, therefore, $x \neq 1$) and the values of p or q are unknown, the value of the expression $\left(\frac{x^p}{x^q}\right)^4$ cannot be determined; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS17153

255. On Monday morning a certain machine ran continuously at a uniform rate to fill a production order. At what time did it completely fill the order that morning?

(1) The machine began filling the order at 9:30 a.m.

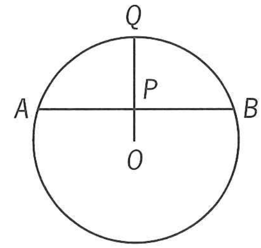
(2) The machine had filled $\frac{1}{2}$ of the order by 10:30 a.m. and $\frac{5}{6}$ of the order by 11:10 a.m.

Arithmetic Arithmetic operations

(1) This merely states what time the machine began filling the order; NOT sufficient.

(2) In the 40 minutes between 10:30 a.m. and 11:10 a.m., $\frac{5}{6} - \frac{1}{2} = \frac{1}{3}$ of the order was filled. Therefore, the entire order was completely filled in $3 \times 40 = 120$ minutes, or 2 hours. Since half the order took 1 hour and was filled by 10:30 a.m., the second half of the order, and thus the entire order, was filled by 11:30 a.m.; SUFFICIENT.

The correct answer is B;
statement 2 alone is sufficient.



DS17107

256. What is the radius of the circle above with center O?

(1) The ratio of OP to PQ is 1 to 2.

(2) P is the midpoint of chord AB.

Geometry Circles

(1) It can be concluded only that the radius is 3 times the length of OP, which is unknown; NOT sufficient.

(2) It can be concluded only that $AP = PB$, and the chord is irrelevant to the radius; NOT sufficient.

Together, (1) and (2) do not give the length of any line segment shown in the circle. In fact, if the circle and all the line segments were uniformly expanded by a factor of, say, 5, the resulting circle and line segments would still satisfy both (1) and (2). Therefore, the radius of the circle cannot be determined from (1) and (2) together.

The correct answer is E;
both statements together are still not sufficient.

DS15618

257. If a and b are positive integers, what is the value of the product ab?

(1) The least common multiple of a and b is 48.

(2) The greatest common factor of a and b is 4.

Arithmetic Properties of numbers

Determine the value of the product of positive integers a and b.

(1) This indicates that the least common multiple (lcm) of a and b is 48, which means that 48 is the least integer that is a multiple of both a and b. If $a = 24$ and $b = 16$, then the multiples of a are 24, 48, 72, . . ., and the multiples of b are 16, 32, 48, 64, ... So, 48 is the lcm of 24 and 16, and $ab = (24)(16)$. However, if $a = 48$ and $b = 16$, then the multiples of a are 48, 96, . . ., and the multiples of b are 16, 32, 48, 64,

. . . . So, 48 is the lcm of 48 and 16, and $ab = (48)(16)$; NOT sufficient.

(2) This indicates that 4 is the greatest common factor (gcf) of a and b, which means that 4 is the greatest integer that is a factor of both a and b. If $a = 4$ and $b = 4$, then 4 is the gcf a and b, and $ab = (4)(4)$. However, if $a = 4$ and $b = 16$, then 4 is the gcf of a and b, and $ab = (4)(16)$; NOT sufficient.

Taking (1) and (2) together, each of a and b is a multiple of 4 (which means that each of a and b is divisible by 4) and 48 is a multiple of each of a and b (which means that 48 is divisible by each of a and b). It follows that the only possible values for a and b are 4, 8, 12, 16, 24, and 48. The following table shows all possible pairs of these values and that only 4 of them ($a = 4$ and $b = 48$, $a = 12$ and $b = 16$, $a = 16$ and $b = 12$, $a = 48$ and $b = 4$), satisfy both (1) and (2).

		b					
		4	8	12	16	24	48
a	4	lcm is 4, not 48	lcm is 8, not 48	lcm is 12, not 48	lcm is 16, not 48	lcm is 24, not 48	lcm is 48, gcf is 4
	8	lcm is 8, not 48	lcm is 8, not 48	lcm is 24, not 48	gcf is 8, not 4	gcf is 8, not 4	gcf is 8, not 4
	12	lcm is 12, not 48	lcm is 24, not 48	gcf is 12, not 4	lcm is 48, gcf is 4	gcf is 12, not 4	gcf is 12, not 4
	16	lcm is 16, not 48	gcf is 8, not 4	lcm is 48, gcf is 4	gcf is 16, not 4	gcf is 8, not 4	gcf is 16, not 4
	24	lcm is 24, not 48	gcf is 8, not 4	gcf is 12, not 4	gcf is 8, not 4	gcf is 24, not 4	gcf is 24, not 4
	48	lcm is 48, gcf is 4	gcf is 8, not 4	gcf is 12, not 4	gcf is 16, not 4	gcf is 24, not 4	gcf is 48, not 4

In each case where both (1) and (2) are satisfied, $ab = 192$.

Alternatively,

(1) Using prime factorizations, since the least common multiple of a and b is 48 and $48 = 2^4 \cdot 3^1$, it follows that $a = 2^p \cdot 3^q$, where $p \le 4$ and $q \le 1$, and $b = 2^r \cdot 3^s$, where $r \le 4$ and $s \le 1$. Since the least common multiple of two positive integers is the product of the highest power of each prime in the prime factorizations of the two integers, one of p or r must be 4 and one of q or s must be 1. If, for example, $p = 4$, $q = 1$, and $r = s = 0$, then $a = 2^4 \cdot 3^1 = 48$, $b = 2^0 \cdot 3^0 = 1$, and $ab = (48)(1) = 48$. However, if $p = 4$, $q = 1$, $r = 4$, and $s = 1$, then $a = 2^4 \cdot 3^1 = 48$, $b = 2^4 \cdot 3^1 = 48$, and $ab = (48)(48) = 2{,}304$; NOT sufficient.

(2) If $a = 4$ and $b = 4$, then the greatest common factor of a and b is 4 and $ab = (4)(4) = 16$. However, if $a = 4$ and $b = 12$, then the greatest common factor of a and b is 4 and $ab = (4)(12) = 48$; NOT sufficient.

Taking (1) and (2) together, by (1), $a = 2^p \cdot 3^q$, where $p \le 4$ and $q \le 1$, and $b = 2^r \cdot 3^s$, where $r \le 4$ and $s \le 1$. Since the least common multiple of two positive integers is the product of the highest power of each prime in the prime factorizations of the two integers, exactly one of p or r must be 4 and the other one must be 2. Otherwise, either the least common multiple of a and b would not be 48 or the greatest common factor would not be 4. Likewise, exactly one of q or s must be 1 and the other one must be 0. The following table gives all possible combinations of values for p, q, r, and s along with corresponding values of a, b, and ab.

p	q	r	s	$a = 2^p \cdot 3^q$	$b = 2^r \cdot 3^s$	ab
2	0	4	1	$2^2 \cdot 3^0 = 4$	$2^4 \cdot 3^1 = 48$	192
2	1	4	0	$2^2 \cdot 3^1 = 12$	$2^4 \cdot 3^0 = 16$	192
4	0	2	1	$2^4 \cdot 3^0 = 16$	$2^2 \cdot 3^1 = 12$	192
4	1	2	0	$2^4 \cdot 3^1 = 48$	$2^2 \cdot 3^0 = 4$	192

In each case, $ab = 192$.

The correct answer is C;
both statements together are sufficient.

DS17095

258. What is the number of 360-degree rotations that a bicycle wheel made while rolling 100 meters in a straight line without slipping?

(1) The diameter of the bicycle wheel, including the tire, was 0.5 meter.

(2) The wheel made twenty 360-degree rotations per minute.

Geometry Circles

For each 360-degree rotation, the wheel has traveled a distance equal to its circumference. Given either the circumference of the wheel or the means to calculate its circumference, it is thus possible to determine the number of times the circumference of the wheel was laid out along the straight-line path of 100 meters.

(1) The circumference of the bicycle wheel can be determined from the given diameter using the equation $C = \pi d$, where d = the diameter; SUFFICIENT.

(2) The speed of the rotations is irrelevant, and no dimensions of the wheel are given; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS17168

259. In the equation $x^2 + bx + 12 = 0$, x is a variable and b is a constant. What is the value of b ?

(1) $x - 3$ is a factor of $x^2 + bx + 12$.

(2) 4 is a root of the equation $x^2 + bx + 12 = 0$.

Algebra First- and second-degree equations

(1) Method 1: If $x - 3$ is a factor, then $x^2 + bx + 12 = (x - 3)(x + c)$ for some constant c. Equating the constant terms (or substituting $x = 0$), it follows that $12 = -3c$, or $c = -4$. Therefore, the quadratic polynomial is $(x - 3)(x - 4)$, which is equal to $x^2 - 7x + 12$, and hence $b = -7$.

Method 2: If $x - 3$ is a factor of $x^2 + bx + 12$, then 3 is a root of $x^2 + bx + 12 = 0$. Therefore, $3^2 + 3b + 12 = 0$, which can be solved to get $b = -7$.

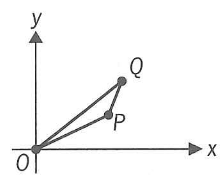
Method 3: The value of b can be found by long division:

$$\begin{array}{r}
x + (b+3) \\
x - 3 \overline{\smash{)}\, x^2 + bx + 12} \\
\underline{x^2 - 3x } \\
(b+3)x + 12 \\
\underline{(b+3)x - 3b - 9} \\
3b + 21
\end{array}$$

These calculations show that the remainder is $3b + 21$. Since the remainder must be 0, it follows that $3b + 21 = 0$, or $b = -7$; SUFFICIENT.

(2) If 4 is a root of the equation, then 4 can be substituted for x in the equation $x^2 + bx + 12 = 0$, yielding $4^2 + 4b + 12 = 0$. This last equation can be solved to obtain a unique value for b; SUFFICIENT.

The correct answer is D;
each statement alone is sufficient.



DS07715

260. In the figure above, line segment OP has slope $\frac{1}{2}$ and line segment PQ has slope 2. What is the slope of line segment OQ ?

(1) Line segment OP has length $2\sqrt{5}$.

(2) The coordinates of point Q are (5,4).

Geometry Coordinate geometry

Let P have coordinates (a,b) and Q have coordinates (x,y). Since the slope of $\overline{OP}$ is $\frac{1}{2}$, it follows that $\frac{b-0}{a-0} = \frac{1}{2}$, or $a = 2b$. What is the slope of $\overline{OQ}$?

(1) Given that $\overline{OP}$ has length $2\sqrt{5}$, it follows from the Pythagorean theorem that $a^2 + b^2 = \left(2\sqrt{5}\right)^2$, or $(2b)^2 + b^2 = 20$, or $5b^2 = 20$. The only positive solution of this equation is $b = 2$, and therefore $a = 2b = 4$

and the coordinates of P are $(a,b) = (4,2)$. However, nothing is known about how far Q is from P. If Q is close to P, then the slope of $\overline{OQ}$ will be close to $\frac{1}{2}$ (the slope of $\overline{OP}$), and if Q is far from P, then the slope of $\overline{OQ}$ will be close to 2 (the slope of $\overline{PQ}$). To be explicit, since the slope of $\overline{PQ}$ is 2, it follows that $\frac{y-2}{x-4} = 2$, or $y = 2x - 6$. Choosing $x = 4.1$ and $y = 2(4.1) - 6 = 2.2$ gives $(x,y) = (4.1,2.2)$, and the slope of $\overline{OQ}$ is $\frac{2.2}{4.1}$, which is close to $\frac{1}{2}$. On the other hand, choosing $x = 100$ and $y = 2(100) - 6 = 194$ gives $(x,y) = (100,194)$, and the slope of $\overline{OQ}$ is $\frac{194}{100}$, which is close to 2; NOT sufficient.

(2) Given that the coordinates of point Q are $(5,4)$, it follows that the slope of $\overline{OQ}$ is $\frac{4-0}{5-0} = \frac{4}{5}$; SUFFICIENT.

The correct answer is B;
statement 2 alone is sufficient.

DS17164

261. In ΔXYZ, what is the length of YZ?

(1) The length of XY is 3.

(2) The length of XZ is 5.

Geometry Triangles

Given the length of one side of a triangle, it is known that the sum of the lengths of the other two sides is greater than that given length. The length of either of the other two sides, however, can be any positive number.

(1) Only the length of one side, XY, is given, and that is not enough to determine the length of YZ; NOT sufficient.

(2) Again, only the length of one side, XZ, is given and that is not enough to determine the length of YZ; NOT sufficient.

Even by using the triangle inequality stated above, only a range of values for YZ can be determined from (1) and (2). If the length of side YZ is represented by k, then it is known both that $3 + 5 > k$ and that $3 + k > 5$, or $k > 2$. Combining these inequalities to determine the length of k yields only that $8 > k > 2$.

The correct answer is E;
both statements together are still not sufficient.

DS07217

262. If the average (arithmetic mean) of n consecutive odd integers is 10, what is the least of the integers?

(1) The range of the n integers is 14.

(2) The greatest of the n integers is 17.

Arithmetic Statistics

Let k be the least of the n consecutive odd integers. Then the n consecutive odd integers are $k, k + 2, k + 4, \ldots, k + 2(n - 1)$, where $k + 2(n - 1)$ is the greatest of the n consecutive odd integers and $[k + 2(n - 1)] - k = 2(n - 1)$ is the range of the n consecutive odd integers. Determine the value of k.

(1) Given that the range of the odd integers is 14, it follows that $2(n - 1) = 14$, or $n - 1 = 7$, or $n = 8$. It is also given that the average of the 8 consecutive odd integers is 10, and so, $\frac{k+(k+2)+(k+4)+\ldots+(k+14)}{8} = 10$ from which a unique value for k can be determined; SUFFICIENT.

(2) Given that the greatest of the odd integers is 17, it follows that the n consecutive odd integers can be expressed as $17, 17 - 2, 17 - 4, \ldots, 17 - 2(n - 1)$. Since the average of the n consecutive odd integers is 10, then

$$\frac{17+(17-2)+(17-4)+\ldots+[17-2(n-1)]}{n} = 10,$$

or

$$17+(17-2)+(17-4)+\ldots+[17-2(n-1)] = 10n \text{ (i)}$$

The n consecutive odd integers can also be expressed as $k, k + 2, k + 4, \ldots, k + 2(n - 1)$.

Since the average of the n consecutive odd integers is 10, then

$$\frac{k+(k+2)+(k+4)+\ldots+[k+2(n-1)]}{n} = 10,$$

or

$$k+(k+2)+(k+4)+\ldots+[k+2(n-1)] = 10n \text{ (ii)}$$

Adding equations (i) and (ii) gives

$$(17+k)+(17+k)+(17+k)+\ldots+(17+k)=20n$$
$$n(17+k)=20n$$
$$17+k=20$$
$$k=3$$

Alternatively, because the numbers are consecutive odd integers, they form a data set that is symmetric about its average, and so the average of the numbers is the average of the least and greatest numbers. Therefore, $10=\frac{k+17}{2}$, from which a unique value for k can be determined; SUFFICIENT.

The correct answer is D; each statement alone is sufficient.

DS16044

263. If x, y, and z are positive numbers, is $x > y > z$?

(1) $xz > yz$

(2) $yx > yz$

Algebra Inequalities

(1) Dividing both sides of the inequality by z yields $x > y$. However, there is no information relating z to either x or y; NOT sufficient.

(2) Dividing both sides of the inequality by y yields only that $x > z$, with no further information relating y to either x or z; NOT sufficient.

From (1) and (2) it can be determined that x is greater than both y and z. Since it still cannot be determined which of y or z is the least, the correct ordering of the three numbers also cannot be determined.

The correct answer is E; both statements together are still not sufficient.

DS06644

264. K is a set of numbers such that

(i) if x is in K, then $-x$ is in K, and

(ii) if each of x and y is in K, then xy is in K.

Is 12 in K?

(1) 2 is in K.

(2) 3 is in K.

Arithmetic Properties of numbers

(1) Given that 2 is in K, it follows that K could be the set of all real numbers, which contains 12. However, if K is the set $\{\ldots,-16,-8,-4,-2,2,4,8,16,\ldots\}$, then K contains 2 and K satisfies both (i) and (ii), but K does not contain 12. To see that K satisfies (ii), note that K can be written as $\{\ldots,-2^4,-2^3,-2^2,-2^1,2^1,2^2,2^3,2^4,\ldots\}$, and thus a verification of (ii) can reduce to verifying that the sum of two positive integer exponents is a positive integer exponent; NOT sufficient.

(2) Given that 3 is in K, it follows that K could be the set of all real numbers, which contains 12. However, if K is the set $\{\ldots,-81,-27,-9,-3,3,9,27,81,\ldots\}$, then K contains 3 and K satisfies both (i) and (ii), but K does not contain 12. To see that K satisfies (ii), note that K can be written as $\{\ldots,-3^4,-3^3,-3^2,-3^1,3^1,3^2,3^3,3^4,\ldots\}$, and thus a verification of (ii) can reduce to verifying that the sum of two positive integer exponents is a positive integer exponent; NOT sufficient.

Given (1) and (2), it follows that both 2 and 3 are in K. Thus, by (ii), $(2)(3)=6$ is in K. Therefore, by (ii), $(2)(6)=12$ is in K.

The correct answer is C; both statements together are sufficient.

DS05637

265. If $x^2+y^2=29$, what is the value of $(x-y)^2$?

(1) $xy=10$

(2) $x=5$

Algebra Simplifying algebraic expressions

Since $(x-y)^2=(x^2+y^2)-2xy$ and it is given that $x^2+y^2=29$, it follows that $(x-y)^2=29-2xy$. Therefore, the value of $(x-y)^2$ can be determined if and only if the value of xy can be determined.

(1) Since the value of xy is given, the value of $(x-y)^2$ can be determined; SUFFICIENT.

(2) Given only that $x=5$, it is not possible to determine the value of xy. Therefore, the value of $(x-y)^2$ cannot be determined; NOT sufficient.

The correct answer is A; statement 1 alone is sufficient.

DS16470

266. After winning 50 percent of the first 20 games it played, Team A won all of the remaining games it played. What was the total number of games that Team A won?

(1) Team A played 25 games altogether.

(2) Team A won 60 percent of all the games it played.

Arithmetic Percents

Let r be the number of the remaining games played, all of which the team won. Since the team won $(50\%)(20) = 10$ of the first 20 games and the r remaining games, the total number of games the team won is $10 + r$. Also, the total number of games the team played is $20 + r$. Determine the value of r.

(1) Given that the total number of games played is 25, it follows that $20 + r = 25$, or $r = 5$; SUFFICIENT.

(2) It is given that the total number of games won is $(60\%)(20 + r)$, which can be expanded as $12 + 0.6r$. Since it is also known that the number of games won is $10 + r$, it follows that $12 + 0.6r = 10 + r$. Solving this equation gives $12 - 10 = r - 0.6r$, or $2 = 0.4r$, or $r = 5$; SUFFICIENT.

The correct answer is D;
each statement alone is sufficient.

DS17181

267. Is x between 0 and 1 ?

(1) x^2 is less than x.

(2) x^3 is positive.

Arithmetic Arithmetic operations

(1) Since x^2 is always nonnegative, it follows that here x must also be nonnegative, that is, greater than or equal to 0. If $x = 0$ or 1, then $x^2 = x$. Furthermore, if x is greater than 1, then x^2 is greater than x. Therefore, x must be between 0 and 1; SUFFICIENT.

(2) If x^3 is positive, then x is positive, but x can be any positive number; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS04083

268. If m and n are nonzero integers, is m^n an integer?

(1) n^m is positive.

(2) n^m is an integer.

Arithmetic Properties of numbers

It is useful to note that if $m > 1$ and $n < 0$, then $0 < m^n < 1$, and therefore m^n will not be an integer. For example, if $m = 3$ and $n = -2$, then $m^n = 3^{-2} = \frac{1}{3^2} = \frac{1}{9}$.

(1) Although it is given that n^m is positive, m^n can be an integer or m^n can fail to be an integer. For example, if $m = 2$ and $n = 2$, then $n^m = 2^2 = 4$ is positive and $m^n = 2^2 = 4$ is an integer. However, if $m = 2$ and $n = -2$, then $n^m = (-2)^2 = 4$ is positive and $m^n = 2^{-2} = \frac{1}{2^2} = \frac{1}{4}$ is not an integer; NOT sufficient.

(2) Although it is given that n^m is an integer, m^n can be an integer or m^n can fail to be an integer. For example, if $m = 2$ and $n = 2$, then $n^m = 2^2 = 4$ is an integer and $m^n = 2^2 = 4$ is an integer. However, if $m = 2$ and $n = -2$, then $n^m = (-2)^2 = 4$ is an integer and $m^n = 2^{-2} = \frac{1}{2^2} = \frac{1}{4}$ is not an integer; NOT sufficient.

Taking (1) and (2) together, it is still not possible to determine if m^n is an integer, since the same examples are used in both (1) and (2) above.

The correct answer is E;
both statements together are still not sufficient.

DS16034

269. What is the value of xy ?

(1) $x + y = 10$

(2) $x - y = 6$

Algebra First- and second-degree equations; Simultaneous equations

(1) Given $x + y = 10$, or $y = 10 - x$, it follows that $xy = x(10 - x)$, which does not have a unique value. For example, if $x = 0$, then $xy = (0)(10) = 0$, but if $x = 1$, then $xy = (1)(9) = 9$; NOT sufficient.

(2) Given $x - y = 6$, or $y = x - 6$, it follows that $xy = x(x - 6)$, which does not have a unique value. For example, if $x = 0$, then $xy = (0)(-6) = 0$, but if $x = 1$, then $xy = (1)(-5) = -5$; NOT sufficient.

Using (1) and (2) together, the two equations can be solved simultaneously for x and y. One way to do this is by adding the two equations, $x + y = 10$ and $x - y = 6$, to get $2x = 16$, or $x = 8$. Then substitute into either of the equations to obtain an equation that can be solved to get $y = 2$. Thus, xy can be determined to have the value $(8)(2) = 16$. Alternatively, the two equations correspond to a pair of nonparallel lines in the (x,y) coordinate plane, which have a unique point in common.

The correct answer is C;
both statements together are sufficient.

DS13189

270. If n is the least of three different integers greater than 1, what is the value of n ?

(1) The product of the three integers is 90.

(2) One of the integers is twice one of the other two integers.

Arithmetic Operations with integers

Given that n is the least of three different integers n, p, and q, where $1 < n < p < q$, determine the value of n.

(1) This indicates that the product of the three integers is 90. The integers could be 2, 5, and 9 since $(2)(5)(9) = 90$, and n would be 2. However, the integers could be 3, 5, and 6 since $(3)(5)(6) = 90$, and n would be 3; NOT sufficient.

(2) This indicates that one of the integers is twice one of the others. It could be that $p = 2n$, or $q = 2n$, or $q = 2p$. For example, if $n = 2$, $p = 4$, and $q = 5$, then $p = 2n$, and the value of n would be 2. If $n = 3$, $p = 4$, and $q = 6$, then $q = 2n$, and the value of n would be 3; NOT sufficient.

Taking (1) and (2) together, if $p = 2n$, then $npq = (n)(2n)(q) = 90$, or $n^2q = 45$. It follows that $n = 3$, $p = (2)(3) = 6$, and $q = 5$. The value of n is 3. If $q = 2n$, then $npq = (n)(p)(2n) = 90$ or $n^2p = 45$. It follows that $n = 3$, $p = 5$, and $q = (2)(3) = 6$. The value of n is 3. If $q = 2p$, then $npq = (n)(p)(2p) = 90$ or $np^2 = 45$. It follows that $n = 5$, $p = 3$, and $q = (2)(3) = 6$, and this case can be eliminated because n is not the least of the three integers. Therefore, the value of n is 3.

Alternatively, taking (1) and (2) together, the integers n, p, and q are among 2, 3, 5, 6, 9, 10, 15, 18, 30, and 45 since they are factors of 90 from (1). Because all three integers are different and $90 = (2)(3)(15) = (2)(3^2)(5)$, n, p, and q must be among the integers 2, 3, 5, 9, 10, and 15. Only two pairs of these integers satisfy (2): 3 and 6 since $6 = (2)(3)$ and 5 and 10 since $10 = (2)(5)$. However, for each possible value for n, $(n)(5)(10) > 90$. Therefore, the only pair that satisfies both (1) and (2) is 3 and 6, and the third integer is then $\frac{90}{(3)(6)} = 5$. Thus, the value of n is 3.

The correct answer is C;
both statements together are sufficient.

DS16461

271. Is x^2 greater than x ?

(1) x^2 is greater than 1.

(2) x is greater than -1.

Arithmetic; Algebra Exponents; Inequalities

(1) Given $x^2 > 1$, it follows that either $x > 1$ or $x < -1$. If $x > 1$, then multiplying both sides of the inequality by the positive number x gives $x^2 > x$. On the other hand, if $x < -1$, then x is negative and x^2 is positive (because $x^2 > 1$), which also gives $x^2 > x$; SUFFICIENT.

(2) Given $x > -1$, x^2 can be greater than x (for example, $x = 2$) and x^2 can fail to be greater than x (for example, $x = 0$); NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS03503

272. Michael arranged all his books in a bookcase with 10 books on each shelf and no books left over. After Michael acquired 10 additional books, he arranged all his books in a new bookcase with 12 books on each shelf and no books left over. How many books did Michael have before he acquired the 10 additional books?

(1) Before Michael acquired the 10 additional books, he had fewer than 96 books.

(2) Before Michael acquired the 10 additional books, he had more than 24 books.

Arithmetic Properties of numbers

If x is the number of books Michael had before he acquired the 10 additional books, then x is a multiple of 10. After Michael acquired the 10 additional books, he had $x + 10$ books and $x + 10$ is a multiple of 12.

(1) If $x < 96$, where x is a multiple of 10, then $x = 10, 20, 30, 40, 50, 60, 70, 80$, or 90 and $x + 10 = 20, 30, 40, 50, 60, 70, 80, 90$, or 100. Since $x + 10$ is a multiple of 12, then $x + 10 = 60$ and $x = 50$; SUFFICIENT.

(2) If $x > 24$, where x is a multiple of 10, then x must be one of the numbers $30, 40, 50, 60, 70, 80, 90, 100, 110, \ldots$, and $x + 10$ must be one of the numbers $40, 50, 60, 70, 80, 90, 100, 110, 120, \ldots$. Since there is more than one multiple of 12 among these numbers (for example, 60 and 120), the value of $x + 10$, and therefore the value of x, cannot be determined; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS16469

273. If $xy > 0$, does $(x - 1)(y - 1) = 1$?

(1) $x + y = xy$

(2) $x = y$

Algebra First- and second-degree equations

By expanding the product $(x - 1)(y - 1)$, the question is equivalent to whether $xy - y - x + 1 = 1$, or $xy - y - x = 0$, when $xy > 0$.

(1) If $x + y = xy$, then $xy - y - x = 0$, and hence by the remarks above, $(x - 1)(y - 1) = 1$; SUFFICIENT.

(2) If $x = y$, then $(x - 1)(y - 1) = 1$ can be true $(x = y = 2)$ and $(x - 1)(y - 1) = 1$ can be false $(x = y = 1)$; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS06842

274. Last year in a group of 30 businesses, 21 reported a net profit and 15 had investments in foreign markets. How many of the businesses did not report a net profit nor invest in foreign markets last year?

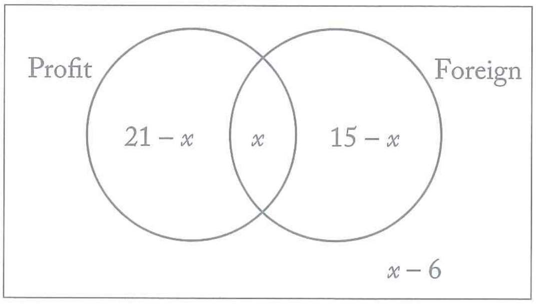
(1) Last year 12 of the 30 businesses reported a net profit and had investments in foreign markets.

(2) Last year 24 of the 30 businesses reported a net profit or invested in foreign markets, or both.

Arithmetic Concepts of sets

Consider the Venn diagram below in which x represents the number of businesses that reported a net profit and had investments in foreign markets. Since 21 businesses reported a net profit, $21 - x$ businesses reported a net profit only. Since 15 businesses had investments in foreign markets, $15 - x$ businesses had investments in foreign markets only. Finally, since there is a total of 30 businesses, the number of businesses that did not report a net profit and did not invest in foreign markets is $30 - (21 - x + x + 15 - x) = x - 6$.

Determine the value of $x - 6$, or equivalently, the value of x.



(1) It is given that $12 = x$; SUFFICIENT.

(2) It is given that $24 = (21 - x) + x + (15 - x)$. Therefore, $24 = 36 - x$, or $x = 12$.

Alternatively, the information given is exactly the number of businesses that are not among those to be counted in answering the question posed in the problem, and therefore the number of businesses that are to be counted is $30 - 24 = 6$; SUFFICIENT.

The correct answer is D;
each statement alone is sufficient.

DS17110

275. Is the perimeter of square S greater than the perimeter of equilateral triangle T?

(1) The ratio of the length of a side of S to the length of a side of T is 4:5.

(2) The sum of the lengths of a side of S and a side of T is 18.

Geometry Perimeter

Letting s and t be the side lengths of square S and triangle T, respectively, the task is to determine if $4s > 3t$, which is equivalent (divide both sides by $4t$) to determining if $\frac{s}{t} > \frac{3}{4}$.

(1) It is given that $\frac{s}{t} = \frac{4}{5}$. Since $\frac{4}{5} > \frac{3}{4}$, it follows that $\frac{s}{t} > \frac{3}{4}$; SUFFICIENT.

(2) Many possible pairs of numbers have the sum of 18. For some of these (s,t) pairs it is the case that $\frac{s}{t} > \frac{3}{4}$ (for example, $s = t = 9$), and for others of these pairs it is not the case that $\frac{s}{t} > \frac{3}{4}$ (for example, $s = 1$ and $t = 17$); NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS17136

276. If $x + y + z > 0$, is $z > 1$?

(1) $z > x + y + 1$

(2) $x + y + 1 < 0$

Algebra Inequalities

(1) The inequality $x + y + z > 0$ gives $z > -x - y$. Adding this last inequality to the given inequality, $z > x + y + 1$, gives $2z > 1$, or $z > \frac{1}{2}$, which suggests that (1) is not sufficient. Indeed, z could be 2 ($x = y = 0$ and $z = 2$ satisfy both $x + y + z > 0$ and $z > x + y + 1$), which is greater than 1, and z could be $\frac{3}{4}$ ($x = y = -\frac{1}{4}$ and $z = \frac{3}{4}$ satisfy both $x + y + z > 0$ and $z > x + y + 1$), which is not greater than 1; NOT sufficient.

(2) It follows from the inequality $x + y + z > 0$ that $z > -(x + y)$. It is given that $x + y + 1 < 0$, or $(x + y) < -1$, or $-(x + y) > 1$. Therefore, $z > -(x + y)$ and $-(x + y) > 1$, from which it follows that $z > 1$; SUFFICIENT.

The correct answer is B;
statement 2 alone is sufficient.

DS07832

277. For all z, $\lceil z \rceil$ denotes the least integer greater than or equal to z. Is $\lceil x \rceil = 0$?

(1) $-1 < x < -0.1$

(2) $\lceil x + 0.5 \rceil = 1$

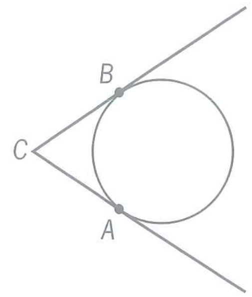
Algebra Operations with real numbers

Determining if $\lceil x \rceil = 0$ is equivalent to determining if $-1 < x \le 0$. This can be inferred by examining a few representative examples, such as $\lceil -1.1 \rceil = -1$, $\lceil -1 \rceil = -1$, $\lceil -0.9 \rceil = 0$, $\lceil -0.1 \rceil = 0$, $\lceil 0 \rceil = 0$, and $\lceil 0.1 \rceil = 1$.

(1) Given $-1 < x < -0.1$, it follows that $-1 < x \le 0$, since $-1 < x \le 0$ represents all numbers x that satisfy $-1 < x < -0.1$ along with all numbers x that satisfy $-0.1 \le x \le 0$; SUFFICIENT.

(2) Given $\lceil x + 0.5 \rceil = 1$, it follows from the same reasoning used just before (1) above that this equality is equivalent to $0 < x + 0.5 \le 1$, which in turn is equivalent to $-0.5 < x \le 0.5$. Since from among these values of x it is possible for $-1 < x \le 0$ to be true (for example, $x = -0.1$) and it is possible for $-1 < x \le 0$ to be false (for example, $x = 0.1$), it cannot be determined if $\lceil x \rceil = 0$; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.



DS16464

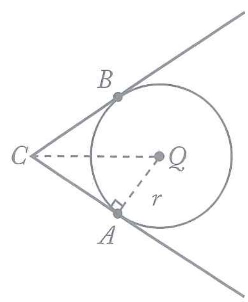
278. The circular base of an above-ground swimming pool lies in a level yard and just touches two straight sides of a fence at points A and B, as shown in the figure above. Point C is on the ground where the two sides of the fence meet. How far from the center of the pool's base is point A ?

(1) The base has area 250 square feet.

(2) The center of the base is 20 feet from point C.

Geometry Circles

Let Q be the center of the pool's base and r be the distance from Q to A, as shown in the figure below.



Since A is a point on the circular base, QA is a radius (r) of the base.

(1) Since the formula for the area of a circle is area $= \pi r^2$, this information can be stated as $250 = \pi r^2$ or $\sqrt{\frac{250}{\pi}} = r$; SUFFICIENT.

(2) Since $\overline{CA}$ is tangent to the base, ΔQAC is a right triangle. It is given that $QC = 20$, but there is not enough information to use the Pythagorean theorem to determine the length of $\overline{QA}$; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS16050

279. If $xy = -6$, what is the value of $xy(x + y)$?

(1) $x - y = 5$

(2) $xy^2 = 18$

Algebra First- and second-degree equations

By substituting -6 as the value of xy, the question can be simplified to "What is the value of $-6(x + y)$?"

(1) Adding y to both sides of $x - y = 5$ gives $x = y + 5$. When $y + 5$ is substituted for x in the equation $xy = -6$, the equation yields $(y + 5)y = -6$, or $y^2 + 5y + 6 = 0$. Factoring the left side of this equation gives $(y + 2)(y + 3) = 0$. Thus, y may have a value of -2 or -3. Since a unique value of y is not determined, neither the value of x nor the value of xy can be determined; NOT sufficient.

(2) Since $xy^2 = (xy)y$ and $xy^2 = 18$, it follows that $(xy)y = 18$. When -6 is substituted for xy, this equation yields $-6y = 18$, and hence $y = -3$. Since $y = -3$ and $xy = -6$, it follows that $-3x = -6$, or $x = 2$. Therefore, the value of $x + y$, and hence the value of $xy(x + y) = -6(x + y)$ can be determined; SUFFICIENT.

The correct answer is B;
statement 2 alone is sufficient.

DS05519

280. $[y]$ denotes the greatest integer less than or equal to y. Is $d < 1$?

(1) $d = y - [y]$

(2) $[d] = 0$

Algebra Operations with real numbers

(1) It is given $d = y - [y]$. If y is an integer, then $y = [y]$, and thus $y - [y] = 0$, which is less than 1. If y is not an integer, then y lies between two consecutive integers, the smaller of which is equal to $[y]$. Since each of these two consecutive integers is at a distance of less than 1 from y, it follows that $[y]$ is at a distance of less than 1 from y, or $y - [y] < 1$. Thus, regardless of whether y is an integer or y is not an integer, it can be determined that $d < 1$; SUFFICIENT.

(2) It is given that $[d] = 0$, which is equivalent to $0 \le d < 1$. This can be inferred by examining a few representative examples, such as $[-0.1] = -1$, $[0] = 0$, $[0.1] = 0$, $[0.9] = 0$, and $[1.1] = 1$. From $0 \le d < 1$, it follows that $d < 1$; SUFFICIENT.

The correct answer is D;
each statement alone is sufficient.

DS14052

281. If N is a positive odd integer, is N prime?

(1) $N = 2^k + 1$ for some positive integer k.

(2) $N + 2$ and $N + 4$ are both prime.

Arithmetic Properties of numbers

Determine whether the positive odd integer N is prime.

(1) This indicates that $N = 2^k + 1$ for some positive integer k. If $k = 1$, then $N = 2^1 + 1 = 3$ and N is prime. However, if $k = 3$, then $N = 2^3 + 1 = 9$ and N is not prime; NOT sufficient.

(2) This indicates that both $N + 2$ and $N + 4$ are prime. If $N = 3$, then $N + 2 = 5$ and $N + 4 = 7$ are both prime and N is prime. However, if $N = 9$, then $N + 2 = 11$ and $N + 4 = 13$ are both prime and N is not prime; NOT sufficient.

Taking (1) and (2) together is of no more help than (1) and (2) taken separately since the same examples were used to show that neither (1) nor (2) is sufficient.

The correct answer is E;
both statements together are still not sufficient.

DS01140

282. If m is a positive integer, then m^3 has how many digits?

(1) m has 3 digits.

(2) m^2 has 5 digits.

Arithmetic Properties of numbers

(1) Given that m has 3 digits, then m could be 100 and $m^3 = 1{,}000{,}000$ would have 7 digits, or m could be 300 and $m^3 = 27{,}000{,}000$ would have 8 digits; NOT sufficient.

(2) Given that m^2 has 5 digits, then m could be 100 (because $100^2 = 10{,}000$ has 5 digits) or m could be 300 (because $300^2 = 90{,}000$ has 5 digits). In the former case, $m^3 = 1{,}000{,}000$ has 7 digits and in the latter case, $m^3 = 27{,}000{,}000$ has 8 digits; NOT sufficient.

Given (1) and (2), it is still possible for m to be 100 or for m to be 300, and thus m^3 could have 7 digits or m^3 could have 8 digits.

The correct answer is E;
both statements together are still not sufficient.

DS03308

283. What is the value of $x^2 - y^2$?

(1) $(x - y)^2 = 9$

(2) $x + y = 6$

Algebra Second-degree equations

Determine the value of $x^2 - y^2$.

(1) This indicates that $(x - y)^2 = 9$. It follows that $x - y = -3$ or $x - y = 3$, which gives information about the value of $x - y$ but not specific information about the value of x, y, or $x^2 - y^2$. For example, if $x = \frac{9}{2}$ and $y = \frac{3}{2}$, then $(x - y)^2 = \left(\frac{9}{2} - \frac{3}{2}\right)^2 = 9$ and $x^2 - y^2 = \frac{81}{4} - \frac{9}{4} = 18$. But if $x = \frac{3}{2}$ and $y = \frac{9}{2}$, then $(x - y)^2 = \left(\frac{3}{2} - \frac{9}{2}\right)^2 = 9$ and $x^2 - y^2 = \frac{9}{4} - \frac{81}{4} = -18$; NOT sufficient.

(2) This indicates that $x + y = 6$ but does not give specific information about the value of x, y, or $x^2 - y^2$. For example, if $x = \frac{9}{2}$ and $y = \frac{3}{2}$, then $x + y = \frac{9}{2} + \frac{3}{2} = 6$ and $x^2 - y^2 = \frac{81}{4} - \frac{9}{4} = 18$. But if $x = \frac{3}{2}$ and $y = \frac{9}{2}$, then $x + y = \frac{3}{2} + \frac{9}{2} = 6$ and $x^2 - y^2 = \frac{9}{4} - \frac{81}{4} = -18$; NOT sufficient.

Taking (1) and (2) together is of no more help than (1) and (2) taken separately since the same examples were used to show that neither (1) nor (2) is sufficient.

Alternatively, note that $x^2 - y^2 = (x - y)(x + y)$. From (1), $x - y = \pm 3$, and from (2), $x + y = 6$. Therefore, taking (1) and (2) together allows for both $x^2 - y^2 = (3)(6) = 18$ and $x^2 - y^2 = (-3)(6) = -18$.

The correct answer is E;
both statements together are still not sufficient.

DS01267

284. For each landscaping job that takes more than 4 hours, a certain contractor charges a total of r dollars for the first 4 hours plus $0.2r$ dollars for each additional hour or fraction of an hour, where $r > 100$. Did a particular landscaping job take more than 10 hours?

(1) The contractor charged a total of $288 for the job.

(2) The contractor charged a total of $2.4r$ dollars for the job.

Algebra Applied problems

If y represents the total number of hours the particular landscaping job took, determine if $y > 10$.

(1) This indicates that the total charge for the job was $288, which means that $r + 0.2r(y - 4) = 288$. From this it cannot be determined if $y > 10$. For example, if $r = 120$ and $y = 11$, then $120 + 0.2(120)(7) = 288$, and the job took more than 10 hours. However, if $r = 160$ and $y = 8$, then $160 + 0.2(160)(4) = 288$, and the job took less than 10 hours; NOT sufficient.

(2) This indicates that $r + 0.2r(y - 4) = 2.4r$, from which it follows that

$r + 0.2ry - 0.8r = 2.4r$	use distributive property
$0.2ry = 2.2r$	subtract $(r - 0.8r)$ from both sides
$y = 11$	divide both sides by $0.2r$

Therefore, the job took more than 10 hours; SUFFICIENT.

The correct answer is B;
statement 2 alone is sufficient.

DS17600

285. If $x^2 = 2^x$, what is the value of x ?

(1) $2x = \left(\frac{x}{2}\right)^3$

(2) $x = 2^{x-2}$

Algebra Exponents

Given $x^2 = 2^x$, determine the value of x. Note that $x \neq 0$ because $0^2 = 0$ and $2^0 = 1$.

(1) This indicates that $2x = \left(\frac{x}{2}\right)^3$, so $2x = \frac{x^3}{8}$ and $16x = x^3$. Since $x \neq 0$, then $16 = x^2$, so $x = -4$ or $x = 4$. However, $(-4)^2 = 16$ and $2^{-4} = \frac{1}{16}$, so $x \neq -4$. Therefore, $x = 4$; SUFFICIENT.

(2) This indicates that $x = 2^{x-2}$, so $x = \frac{2^x}{2^2}$ and $4x = 2^x$. Since it is given that $x^2 = 2^x$, then $4x = x^2$ and, because $x \neq 0$, it follows that $x = 4$; SUFFICIENT.

The correct answer is D;
each statement alone is sufficient.

DS01169

286. The sequence $s_1, s_2, s_3, \ldots, s_n, \ldots$ is such that $s_n = \frac{1}{n} - \frac{1}{n+1}$ for all integers $n \geq 1$. If k is a positive integer, is the sum of the first k terms of the sequence greater than $\frac{9}{10}$?

(1) $k > 10$

(2) $k < 19$

Arithmetic Sequences

The sum of the first k terms can be written as

$$\left(\frac{1}{1} - \frac{1}{2}\right) + \left(\frac{1}{2} - \frac{1}{3}\right) + \ldots + \left(\frac{1}{k-1} - \frac{1}{k}\right) + \left(\frac{1}{k} - \frac{1}{k+1}\right)$$

$$= 1 + \left(-\frac{1}{2} + \frac{1}{2}\right) + \left(-\frac{1}{3} + \frac{1}{3}\right) + \ldots + \left(-\frac{1}{k} + \frac{1}{k}\right) - \frac{1}{k+1}$$

$$= 1 - \frac{1}{k+1}.$$

Therefore, the sum of the first k terms is greater than $\frac{9}{10}$ if and only if $1 - \frac{1}{k+1} > \frac{9}{10}$, or $1 - \frac{9}{10} > \frac{1}{k+1}$, or $\frac{1}{10} > \frac{1}{k+1}$. Multiplying both sides of the last inequality by $10(k + 1)$ gives the equivalent condition $k + 1 > 10$, or $k > 9$.

(1) Given that $k > 10$, then it follows that $k > 9$; SUFFICIENT.

(2) Given that $k < 19$, it is possible to have $k > 9$ (for example, $k = 15$) and it is possible to not have $k > 9$ (for example, $k = 5$); NOT sufficient.

The correct answer is A; statement 1 alone is sufficient.

DS05518

287. In the sequence S of numbers, each term after the first two terms is the sum of the two immediately preceding terms. What is the 5th term of S?

(1) The 6th term of S minus the 4th term equals 5.

(2) The 6th term of S plus the 7th term equals 21.

Arithmetic Sequences

If the first two terms of sequence S are a and b, then the remaining terms of sequence S can be expressed in terms of a and b as follows.

n	nth term of sequence S
1	a
2	b
3	$a + b$
4	$a + 2b$
5	$2a + 3b$
6	$3a + 5b$
7	$5a + 8b$

For example, the 6th term of sequence S is $3a + 5b$ because $(a + 2b) + (2a + 3b) = 3a + 5b$. Determine the value of the 5th term of sequence S, that is, the value of $2a + 3b$.

(1) Given that the 6th term of S minus the 4th term of S is 5, it follows that $(3a + 5b) - (a + 2b) = 5$. Combining like terms, this equation can be rewritten as $2a + 3b = 5$, and thus the 5th term of sequence S is 5; SUFFICIENT.

(2) Given that the 6th term of S plus the 7th term of S is 21, it follows that $(3a + 5b) + (5a + 8b) = 21$. Combining like terms, this equation can be rewritten as $8a + 13b = 21$. Letting e represent the 5th term of sequence S, this last equation is equivalent to $4(2a + 3b) + b = 21$, or $4e + b = 21$, which gives a direct correspondence between the 5th term of sequence S and the 2nd term of sequence S. Therefore, the 5th term of sequence S can be determined if and only if the 2nd term of sequence S can be determined. Since the 2nd term of sequence S cannot be determined, the 5th term of sequence S cannot be determined. For example, if $a = 1$ and $b = 1$, then $8a + 13b = 8(1) + 13(1) = 21$ and the 5th term of sequence S is $2a + 3b = 2(1) + 3(1) = 5$. However, if $a = 0$ and $b = \frac{21}{13}$, then
$$8a+13b=8(0)+13\left(\frac{21}{13}\right)=21$$
and the 5th term of sequence S is
$$2a+3b=2(0)+3\left(\frac{21}{13}\right)=\frac{63}{13};\text{ NOT}$$
sufficient.

The correct answer is A; statement 1 alone is sufficient.

DS01121

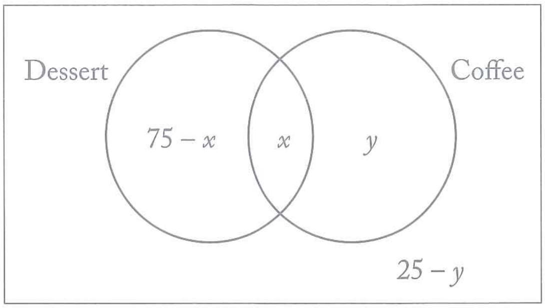
288. If 75 percent of the guests at a certain banquet ordered dessert, what percent of the guests ordered coffee?

(1) 60 percent of the guests who ordered dessert also ordered coffee.

(2) 90 percent of the guests who ordered coffee also ordered dessert.

Arithmetic Concepts of sets; Percents

Consider the Venn diagram below that displays the various percentages of 4 groups of the guests. Thus, x percent of the guests ordered both dessert and coffee and y percent of the guests ordered coffee only. Since 75 percent of the guests ordered dessert, $(75 - x)\%$ of the guests ordered dessert only. Also, because the 4 percentages represented in the Venn diagram have a total sum of 100 percent, the percentage of guests who did not order either dessert or coffee is $100 - [(75 - x) + x + y] = 25 - y$. Determine the percentage of guests who ordered coffee, or equivalently, the value of $x + y$.



(1) Given that x is equal to 60 percent of 75, or 45, the value of $x + y$ cannot be determined; NOT sufficient.

(2) Given that 90 percent of $x + y$ is equal to x, it follows that $0.9(x + y) = x$, or $9(x + y) = 10x$. Therefore, $9x + 9y = 10x$, or $9y = x$. From this the value of $x + y$ cannot be determined. For example, if $x = 9$ and $y = 1$, then all 4 percentages in the Venn diagram are between 0 and 100, $9y = x$, and $x + y = 10$. However, if $x = 18$ and $y = 2$, then all 4 percentages in the Venn diagram are between 0 and 100, $9y = x$, and $x + y = 20$; NOT sufficient.

Given both (1) and (2), it follows that $x = 45$ and $9y = x$. Therefore, $9y = 45$, or $y = 5$, and hence $x + y = 45 + 5 = 50$.

The correct answer is C;
both statements together are sufficient.

DS05302

289. A tank containing water started to leak. Did the tank contain more than 30 gallons of water when it started to leak? (Note: 1 gallon = 128 ounces)

(1) The water leaked from the tank at a constant rate of 6.4 ounces per minute.

(2) The tank became empty less than 12 hours after it started to leak.

Arithmetic Rate problems

(1) Given that the water leaked from the tank at a constant rate of 6.4 ounces per minute, it is not possible to determine if the tank leaked more than 30 gallons of water. In fact, any nonzero amount of water leaking from the tank is consistent with a leakage rate of 6.4 ounces per minute, since nothing can be determined about the amount of time the water was leaking from the tank; NOT sufficient.

(2) Given that the tank became empty in less than 12 hours, it is not possible to determine if the tank leaked more than 30 gallons of water because the rate at which water leaked from the tank is unknown. For example, the tank could have originally contained 1 gallon of water that emptied in exactly 10 hours or the tank could have originally contained 31 gallons of water that emptied in exactly 10 hours; NOT sufficient.

Given (1) and (2) together, the tank emptied at a constant rate of

$$\left(6.4\frac{\text{oz}}{\text{min}}\right)\left(60\frac{\text{min}}{\text{hr}}\right)\left(\frac{1}{128}\frac{\text{gal}}{\text{oz}}\right) = \frac{(64)(6)}{128}\frac{\text{gal}}{\text{hr}} =$$

$\frac{(64)(6)}{(64)(2)}\frac{\text{gal}}{\text{hr}} = 3\frac{\text{gal}}{\text{hr}}$ for less than 12 hours.

If t is the total number of hours the water leaked from the tank, then the total amount of water emptied from the tank, in gallons, is $3t$, which is therefore less than $(3)(12) = 36$. From this it is not possible to determine if the tank originally contained more than 30 gallons of water. For example, if the tank leaked water for a total of 11 hours, then the tank originally contained (3)(11) gallons of water, which is more than 30 gallons of water. However, if the tank leaked water for a total of 2 hours, then the tank originally contained (3)(2) gallons of water, which is not more than 30 gallons of water.

The correct answer is E;
both statements together are still not sufficient.

DS12752

290. In the xy-plane, lines k and ℓ intersect at the point $(1,1)$. Is the y-intercept of k greater than the y-intercept of ℓ?

(1) The slope of k is less than the slope of ℓ.

(2) The slope of ℓ is positive.

Algebra Coordinate geometry

Let m_1 and m_2 represent the slopes of lines k and ℓ, respectively. Then, using the point-slope form for the equation of a line, an equation of line k can be determined: $y - 1 = m_1(x - 1)$, or $y = m_1x + (1 - m_1)$. Similarly, an equation for line ℓ is $y = m_2x + (1 - m_2)$. Determine if $(1 - m_1) > (1 - m_2)$, or equivalently if $m_1 < m_2$.

(1) This indicates that $m_1 < m_2$; SUFFICIENT.

(2) This indicates that $m_2 > 0$. If $m_1 = -1$, for example, then $m_1 < m_2$, but if $m_2 = 4$ and $m_1 = 5$, then $m_1 > m_2$; NOT sufficient.

The correct answer is A; statement 1 alone is sufficient.

DS14588

291. A triangle has side lengths of a, b, and c centimeters. Does each angle in the triangle measure less than 90 degrees?

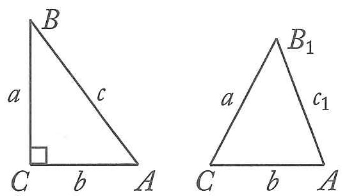
(1) The 3 semicircles whose diameters are the sides of the triangle have areas that are equal to 3 cm², 4 cm², and 6 cm², respectively.

(2) $c < a + b < c + 2$

Geometry Triangles; Pythagorean theorem

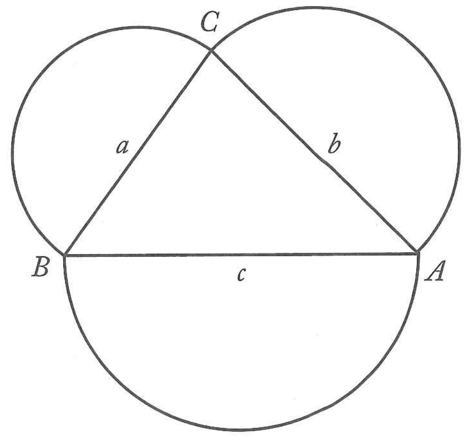
Given a triangle with sides of lengths a, b, and c centimeters, determine whether each angle of the triangle measures less than 90°. Assume that the vertices of the triangle are A, B, and C and that a is the side length of the side opposite $\angle A$, b is the side length of the side opposite $\angle B$, and c is the side length of the side opposite $\angle C$, where $a \le b \le c$.

Note that for a right triangle, $a^2 + b^2 = c^2$. However, if $a^2 + b^2 > c^2$, then the triangle is acute (i.e., a triangle with each angle measuring less than 90°). This is illustrated by the following figures.



ΔBCA on the left is a right triangle with sides $BC = a$, $CA = b$, and $AB = c$, where $a^2 + b^2 = c^2$ by the Pythagorean theorem. The triangle on the right, ΔB_1CA, has sides $B_1C = a$, $CA = b$, and $AB_1 = c_1$. Clearly $AB = c > AB_1 = c_1$, so $c^2 > c_1{}^2$. Since $a^2 + b^2 = c^2$ and $c^2 > c_1{}^2$, it follows that $a^2 + b^2 > c_1{}^2$, and ΔB_1CA is clearly an acute triangle.

(1) This indicates that the areas of the 3 semicircles whose diameters are the sides of the triangle are 3 cm², 4 cm², and 6 cm², respectively. Then, because "respectively" implies that a is the diameter of the semicircle with area 3 cm², b is the diameter of the semicircle with area 4 cm², and c is the diameter of the semicircle with area 6 cm², as shown below, then $3 = \frac{1}{2}\pi\left(\frac{a}{2}\right)^2$ from which it follows that $a^2 = \frac{24}{\pi}$. Similarly, $b^2 = \frac{32}{\pi}$, and $c^2 = \frac{48}{\pi}$.



Because $a^2 + b^2 = \frac{24}{\pi} + \frac{32}{\pi} = \frac{56}{\pi} > \frac{48}{\pi} = c^2$, the angle with greatest measure (i.e., the angle at C) is an acute angle, which implies that each angle in the triangle is acute and measures less than 90°; SUFFICIENT.

(2) This indicates that $c < a + b < c + 2$. If $a = 1$, $b = 1$, and $c = 1$, then $1 < 1 + 1 < 1 + 2$. It follows that the triangle is equilateral; therefore, each angle measures less than 90°. However, if $a = 1$, $b = 1$, and $c = \sqrt{2}$, then $\sqrt{2} < 1 + 1 < \sqrt{2} + 2$, but $1^2 + 1^2 = (\sqrt{2})^2$ and the triangle is a right triangle; NOT sufficient.

The correct answer is A; statement 1 alone is sufficient.

DS00890

292. Each of the 45 books on a shelf is written either in English or in Spanish, and each of the books is either a hardcover book or a paperback. If a book is to be selected at random from the books on the shelf, is the probability less than $\frac{1}{2}$ that the book selected will be a paperback written in Spanish?

(1) Of the books on the shelf, 30 are paperbacks.

(2) Of the books on the shelf, 15 are written in Spanish.

Arithmetic Probability

(1) This indicates that 30 of the 45 books are paperbacks. Of the 30 paperbacks, 25 could be written in Spanish. In this case, the probability of randomly selecting a paperback book written in Spanish is $\frac{25}{45} > \frac{1}{2}$. On the other hand, it is possible that only 5 of the paperback books are written in Spanish. In this case, the probability of randomly selecting a paperback book written in Spanish is $\frac{5}{45} < \frac{1}{2}$; NOT sufficient.

(2) This indicates that 15 of the books are written in Spanish. Then, at most 15 of the 45 books on the shelf are paperbacks written in Spanish, and the probability of randomly selecting a paperback book written in Spanish is at most $\frac{15}{45} < \frac{1}{2}$; SUFFICIENT.

The correct answer is B;
statement 2 alone is sufficient.

DS06683

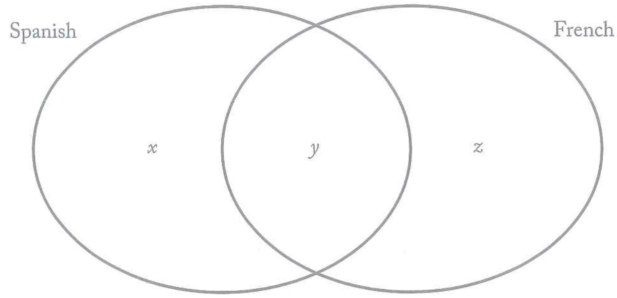
293. A small school has three foreign language classes, one in French, one in Spanish, and one in German. How many of the 34 students enrolled in the Spanish class are also enrolled in the French class?

(1) There are 27 students enrolled in the French class, and 49 students enrolled in either the French class, the Spanish class, or both of these classes.

(2) One-half of the students enrolled in the Spanish class are enrolled in more than one foreign language class.

Arithmetic Sets

Given that 34 students are enrolled in the Spanish class, how many students are enrolled in both the Spanish and French classes? In other words, given that $x + y = 34$ in the diagram below, what is the value of y ?



(1) It is given that $y + z = 27$ and $x + y + z = 49$. Adding the equations $x + y = 34$ and $y + z = 27$ gives $x + 2y + z = 34 + 27 = 61$, or $y + (x + y + z) = 61$. Since $x + y + z = 49$, it follows that $y + 49 = 61$, or $y = 12$; SUFFICIENT.

(2) Given that half the students enrolled in the Spanish class are enrolled in more than one foreign language class, then it is possible that no students are enrolled in the French and German classes only and 17 students are enrolled in both the Spanish and French classes. On the other hand, it is also possible that there are 17 students enrolled in the French and German classes only and no students enrolled in both the Spanish and French classes; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS04910

294. If S is a set of four numbers w, x, y, and z, is the range of the numbers in S greater than 2 ?

(1) $w - z > 2$

(2) z is the least number in S.

Arithmetic Statistics

The range of the numbers w, x, y, and z is equal to the greatest of those numbers minus the least of those numbers.

(1) This reveals that the difference between two of the numbers in the set is greater than 2, which means that the range of the four numbers must also be greater than 2; SUFFICIENT.

(2) The information that z is the least number gives no information regarding the other numbers or their range; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS12187

295. Last year $\frac{3}{5}$ of the members of a certain club were males. This year the members of the club include all the members from last year plus some new members. Is the fraction of the members of the club who are males greater this year than last year?

(1) More than half of the new members are male.

(2) The number of members of the club this year is $\frac{6}{5}$ the number of members last year.

Arithmetic Operations with fractions

Let L represent the number of members last year; N the number of new members added this year; and x the number of members added this year who are males. It is given that $\frac{3}{5}$ of the members last year were males. It follows that the number of members who are male this year is $\frac{3}{5}L + x$. Also, the total number of members this year is $L + N$. Determine if $\frac{\frac{3}{5}L+x}{L+N} > \frac{3}{5}$, or equivalently, determine if $3L + 5x > 3L + 3N$ or simply if $x > \frac{3}{5}N$.

(1) This indicates that $x > \frac{1}{2}N$. If, for example, $N = 20$ and $x = 11$, then $11 > \frac{1}{2}(20) = 10$, but $11 \not> \frac{3}{5}(20) = 12$. On the other hand, if $N = 20$ and $x = 16$, then $16 > \frac{1}{2}(20) = 10$, and $16 > \frac{3}{5}(20) = 12$; NOT sufficient.

(2) This indicates that $L + N = \frac{6}{5}L$. It follows that $N = \frac{1}{5}L$. If, for example, $L = 100$, then $N = \frac{1}{5}(100) = 20$. If $x = 11$, then $11 \not> \frac{3}{5}(20) = 12$. On the other hand, if $x = 16$, then $16 > \frac{1}{2}(20) = 10$, and $16 > \frac{3}{5}(20) = 12$; NOT sufficient.

Taking (1) and (2) together is of no more help than (1) and (2) taken separately since the same examples were used to show that neither (1) nor (2) is sufficient.

The correct answer is E;
both statements together are still not sufficient.

DS13640

296. If a, b, and c are consecutive integers and $0 < a < b < c$, is the product abc a multiple of 8 ?

(1) The product ac is even.

(2) The product bc is a multiple of 4.

Arithmetic Operations with integers

Determine whether the product of three consecutive positive integers, a, b and c, where $a < b < c$, is a multiple of 8.

Since a, b, and c are consecutive integers, then either both a and c are even and b is odd, or both a and c are odd and b is even.

(1) This indicates that at least one of a or c is even, so both a and c are even. Since, when counting from 1, every fourth integer is a multiple of 4, one integer of the pair of consecutive even integers a and c is a multiple of 4. Since the other integer of the pair is even, the product ac is a multiple of 8, and, therefore, abc is a multiple of 8; SUFFICIENT.

(2) This indicates that bc is a multiple of 4. If $b = 3$ and $c = 4$, then $a = 2$ and $bc = 12$, which is a multiple of 4. In this case, $abc = (2)(3)(4) = 24$, which is a multiple of 8. However, if $b = 4$ and $c = 5$, then $a = 3$ and $bc = 20$, which is a multiple of 4. In this case, $abc = (3)(4)(5) = 60$, which is not a multiple of 8; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.

DS13837

297. M and N are integers such that $6 < M < N$. What is the value of N ?

(1) The greatest common divisor of M and N is 6.

(2) The least common multiple of M and N is 36.

Arithmetic Properties of numbers

(1) Given that the greatest common divisor (GCD) of M and N is 6 and $6 < M < N$, then it is possible that $M = (6)(5) = 30$ and $N = (6)(7) = 42$. However, it is also possible that $M = (6)(7) = 42$ and $N = (6)(11) = 66$; NOT sufficient.

(2) Given that the least common multiple (LCM) of M and N is 36 and $6 < M < N$, then it is possible that $M = (4)(3) = 12$ and $N = (9)(2) = 18$. However, it is also possible that $M = (4)(3) = 12$ and $N = (9)(4) = 36$; NOT sufficient.

Taking (1) and (2) together, it follows that 6 is a divisor of M and M is a divisor of 36. Therefore, M is among the numbers 6, 12, 18, and 36. For the same reason, N is among the numbers 6, 12, 18, and 36. Since $6 < M < N$, it follows that M cannot be 6 or 36 and N cannot be 6. Thus, there are three choices for M and N such that $M < N$. These three choices are displayed in the table below, which indicates why only one of the choices, namely $M = 12$ and $N = 18$, satisfies both (1) and (2).

M	N	GCD	LCM
12	18	6	36
12	36	12	36
18	36	18	36

The correct answer is C;
both statements together are sufficient.

DS07575

298. Stations X and Y are connected by two separate, straight, parallel rail lines that are 250 miles long. Train P and train Q simultaneously left Station X and Station Y, respectively, and each train traveled to the other's point of departure. The two trains passed each other after traveling for 2 hours. When the two trains passed, which train was nearer to its destination?

(1) At the time when the two trains passed, train P had averaged a speed of 70 miles per hour.

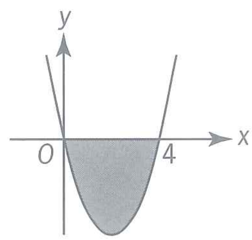
(2) Train Q averaged a speed of 55 miles per hour for the entire trip.

Arithmetic Applied problems; Rates

(1) This indicates that Train P had traveled $2(70) = 140$ miles when it passed Train Q. It follows that Train P was $250 - 140 = 110$ miles from its destination and Train Q was 140 miles from its destination, which means that Train P was nearer to its destination when the trains passed each other; SUFFICIENT.

(2) This indicates that Train Q averaged a speed of 55 miles per hour for the entire trip, but no information is given about the speed of Train P. If Train Q traveled for 2 hours at an average speed of 55 miles per hour and Train P traveled for 2 hours at an average speed of 70 miles per hour, then Train P was nearer to its destination when the trains passed. However, if Train Q traveled for 2 hours at an average speed of 65 miles per hour and Train P traveled for 2 hours at an average speed of 60 miles per hour, then Train Q was nearer to its destination when the trains passed. Note that if Train Q traveled at $\frac{(120)(55)}{140} = 47\frac{1}{7}$ miles per hour for the remainder of the trip, then its average speed for the whole trip was 55 miles per hour; NOT sufficient.

The correct answer is A;
statement 1 alone is sufficient.



DS01613

299. In the xy-plane shown, the shaded region consists of all points that lie above the graph of $y = x^2 - 4x$ and below the x-axis. Does the point (a,b) (not shown) lie in the shaded region if $b < 0$?

(1) $0 < a < 4$

(2) $a^2 - 4a < b$

Algebra Coordinate geometry

In order for (a,b) to lie in the shaded region, it must lie above the graph of $y = x^2 - 4x$ and below the x-axis. Since $b < 0$, the point (a,b) lies below the x-axis. In order for (a,b) to lie above the graph of $y = x^2 - 4x$, it must be true that $b > a^2 - 4a$.

(1) This indicates that $0 < a < 4$. If $a = 2$, then $a^2 - 4a = 2^2 - 4(2) = -4$, so if $b = -1$, then $b > a^2 - 4a$ and (a,b) is in the shaded region. But if $b = -5$, then $b < a^2 - 4a$ and

(a,b) is not in the shaded region; NOT sufficient.

(2) This indicates that $b > a^2 - 4a$, and thus, (a,b) is in the shaded region; SUFFICIENT.

The correct answer is B; statement 2 alone is sufficient.

DS01685

300. If a and b are positive integers, is $\sqrt[3]{ab}$ an integer?

(1) $\sqrt{a}$ is an integer.

(2) $b = \sqrt{a}$

Arithmetic Properties of numbers

(1) Given that $\sqrt{a}$ is an integer, then $a = 4$ is possible. If, in addition $b = 1$, then $\sqrt[3]{ab} = \sqrt[3]{4}$ is not an integer. However, if, in addition $b = 2$, then $\sqrt[3]{ab} = \sqrt[3]{8} = 2$ is an integer; NOT sufficient.

(2) Given that $b = \sqrt{a}$, then $\sqrt[3]{ab} = \sqrt[3]{a\sqrt{a}} = \sqrt[3]{\sqrt{a^3}} = \sqrt{\sqrt[3]{a^3}} = \sqrt{a} = b$ is an integer; SUFFICIENT.

The correct answer is B; statement 2 alone is sufficient.

6.0 Quantitative Question Index

6.0 Quantitative Question Index

The Quantitative Question Index is organized by difficulty level, GMAT section, and then by math concept. All the numbers below are associated with the problem numbers in the guide and not the page numbers.

There are different ways you can classify and categorize each of the different types of problems. Below are the GMAC classification and categorization of the quantitative practice problems.

Difficulty: Easy

Data Sufficiency: Algebra

Applied problems: 198

Arithmetic operations: 201

Equations: 202

Exponents: 186

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Data Sufficiency: Arithmetic

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Problem Solving: Algebra

Problem Solving: Arithmetic

Problem Solving: Geometry

7.0 GMAT Official Guide Quantitative Review Online Index

GMAT Official Guide Quantitative Review Online Index

ARE YOU USING BOTH THE BOOK AND THE ONLINE QUESTION BANK TO STUDY? If so, use the following index to locate a question from the online question bank in the book.

To locate a question from the online question bank in the book—Every question in the online question bank has a unique ID, called the Practice Question Identifier or PQID, which appears above the question number. Look up the PQID in the table to find its problem number and page number in the book.

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