

# ManhantanCAT PS and DS questions

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## DS

1.3066 Ashok and Brian are both walking east along the same path; Ashok walks at a faster constant speed than does Brian. If Brian starts 30 miles east of Ashok and both begin walking at the same time, how many miles will Brian walk before Ashok catches up with him?

- (1) Brian's walking speed is twice the difference between Ashok's walking speed and his own.
- (2) If Ashok's walking speed were five times as great, it would be three times the sum of his and Brian's actual walking speeds.

2.3065 The next number in a certain sequence is defined by multiplying the previous term by some positive constant  $k$ , where  $k \neq 1$ . How many of the first nine terms in this sequence are greater than 1?

- (1) The ninth term in this sequence is 81.
- (2) The fifth term in this sequence is 1.

3.3064 The next number in a certain sequence is defined by multiplying the previous term by some positive constant  $k$ , where  $k \neq 1$ . How many of the first nine terms in this sequence are greater than 1?

- (1) The ninth term in this sequence is 81.
- (2) The fifth term in this sequence is 1.

4.3063 Point  $Q$  lies in the interior of a particular circle. Is point  $Q$  the center of the circle?

- (1) There exist points  $A$ ,  $B$ , and  $C$ , all distinct points on the circle's circumference, such that the distances  $QA$ ,  $QB$ , and  $QC$  are identical.
- (2) At least two different diameters of the circle contain point  $Q$ .

5.3062 Of the birds in a particular aviary, 30 are both spotted and crested and 10 are neither spotted nor crested. What is the total number of birds in the aviary?

- (1) The number of birds that are spotted but not crested is 10 greater than the number of birds that are crested but not spotted.
- (2) More than  $3/5$  of the birds in the aviary are spotted.

6.3056 Guests at a recent party ate a total of fifteen hamburgers. Each guest who was neither a student nor a vegetarian ate exactly one hamburger; no other guests ate hamburgers. If half of the guests were vegetarians, how many guests attended the party?

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(1) The vegetarians attended the party at a rate of 2 students to every 3 non-students, half the rate for non-vegetarians.

(2) 30% of the guests were vegetarian non-students.

7.3040 If  $n$  is an integer between 100 and 900, what is the tens digit of  $n$ ?

(1) If  $n$  is rounded to the nearest ten and the result is then rounded to the nearest hundred, the final value differs from the result of rounding  $n$  to the nearest hundred.

(2) The tens digit of  $n$  is half the units digit of  $n$  and is twice the hundreds digit of  $n$ .

8.3039 If  $a \neq 0$  and  $n$  is a positive integer, is  $n$  odd?

(1)  $a^n + a^{n+1} < 0$

(2)  $a$  is an integer.

9.3038 If  $a$ ,  $b$ , and  $c$  are three positive integers, each greater than 1, what is the remainder when the product  $abc$  is divided by 2?

(1) If each of  $a$ ,  $b$ , and  $c$  is divided by 2, the product of all three remainders is 0.

(2) If each of  $a$ ,  $b$ , and  $c$  is divided by 2, the sum of all three remainders is 2.

10.3035 At a particular store, candy bars are normally priced at \$1.00 each. Last week, the store offered a promotion under which customers purchasing one candy bar at full price could purchase a second candy bar for \$0.50. A third candy bar would cost \$1.00, a fourth would cost \$0.50, and so on. If, in a single transaction during the promotion, Rajiv spent  $D$  dollars on  $N$  candy bars, where  $D$  and  $N$  are integers, is  $N$  even?

(1)  $D$  is prime.

(2)  $D$  is divisible by 3.

11.3034 If the original price of an item in a retail store is marked up by  $m$  percent and the resulting price is then discounted by  $d$  percent, where  $m$  and  $d$  are integers between 0 and 100, is the item's final price (after both changes) greater than its original price?

(1)  $m > d$

(2)  $m = 1.5d$

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12.3023 Machines A and B each produce tablets at their respective constant rates. Machine A has produced 30 tablets when Machine B is turned on. Both machines continue to run until Machine B's total production catches up to Machine A's total production. How many tablets does Machine A produce in the time that it takes Machine B to catch up?

- (1) Machine A's rate is twice the difference between the rates of the two machines.
- (2) The sum of Machine A's rate and Machine B's rate is five times the difference between the two rates.

13.3015 If list  $S$  contains nine distinct integers, at least one of which is negative, is the median of the integers in list  $S$  positive?

- (1) The product of the nine integers in list  $S$  is equal to the median of list  $S$ .
- (2) The sum of all nine integers in list  $S$  is equal to the median of list  $S$ .

14.3013 A list contains only integers. Are there more positive than negative integers in the list?

- (1) The median of the numbers in the list is positive.
- (2) The average (arithmetic mean) of the numbers in the list is positive.

15.3011 In a certain sport, teams receive 3 points for each win, 1 point for each draw, and no points for losses. In a five-team tournament in this sport, in which each of teams  $G$ ,  $H$ ,  $J$ ,  $K$ , and  $L$  played each other team exactly once, did team  $L$  finish the tournament with the highest point total?

- (1) Team  $L$  finished with 8 points.
- (2) The sum of all five teams' point totals for the tournament was 23 points.

16.3010 Four men and three women make up a seven-member committee. The committee has one male captain and one female captain. If all seven committee members are seated in a straight row of seven chairs, does at least one man sit next to another man?

- (1) No woman sits next to another woman.
- (2) The captains sit in the first and seventh chairs.

17.3009 A circle is drawn within the interior of a rectangle. Does the circle occupy more than one-half of the rectangle's area?

- (1) The rectangle's length is more than twice its width.

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(2) If the rectangle's length and width were each reduced by 25% and the circle unchanged, the circle would still fit into the interior of the new rectangle.

18.3004 If  $a$ ,  $b$ , and  $c$  are positive numbers such that  $a$  is  $b$  percent of  $c$ , what is the value of  $c$ ?

(1)  $a$  is  $c$  percent of  $b$ .

(2)  $b$  is  $c$  percent of  $a$ .

19.3000 If the positive integer  $x$  is rounded to the nearest ten, will the result be greater than  $x$ ?

(1) If  $x$  is divided by 10, the remainder is even.

(2) If  $x$  is divided by 5, the remainder is odd.

20.2999 If  $0 < x < 1$ , is it possible to write  $x$  as a terminating decimal?

(1)  $24x$  is an integer.

(2)  $28x$  is an integer.

### PROBLEM SOLVING

1.3068

A rectangular wall is covered entirely with two kinds of decorative tiles: regular and jumbo.  $\frac{1}{3}$  of the tiles are jumbo tiles, which have a length three times that of regular tiles and have the same ratio of length to width as the regular tiles. If regular tiles cover 80 square feet of the wall, and no tiles overlap, what is the area of the entire wall?

- ☐ 160
- ☐ 240
- ☐ 360
- ☐ 440
- ☐ 560

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2.3059 List R contains five numbers that have an average value of 55. If the median of the numbers in the list is equal to the mean and the largest number is equal to 20 more than two times the smallest number, what is the smallest possible value in the list?

- ☐ 35
- ☐ 30
- ☐ 25
- ☐ 20
- ☐ 15

3.3058 The manufacturer's suggested retail price (MSRP) of a certain item is \$60. Store A sells the item for 20 percent more than the MSRP. The regular price of the item at Store B is 30 percent more than the MSRP, but the item is currently on sale for 10 percent less than the regular price. If sales tax is 5 percent of the purchase price at both stores, how much more will someone **PAY** in sales tax to purchase the item at Store A?

- ☐ \$0
- ☐ \$0.09
- ☐ \$0.18
- ☐ \$0.30
- ☐ \$1.80

4.3057 It takes the high-speed train  $x$  hours to travel the  $z$  miles from Town A to Town B at a constant rate, while it takes the regular train  $y$  hours to travel the same distance at a constant rate. If the high-speed train leaves Town A for Town B at the same time that the regular train leaves Town B for Town A, how many more miles will the high-speed train have traveled than the regular train when the two trains pass each other?

$$\frac{xy(x-y)}{x+y}$$

$$\frac{z(x-y)}{x+y}$$

$$\frac{z(x+y)}{y-x}$$

$$\frac{xy(x-y)}{x+y}$$

$$\frac{xy(y-x)}{x+y}$$

5.3054 Which of the following expressions CANNOT have a negative value?

- ☐  $|a + b| - |a - b|$
- ☐  $|a + b| - |a|$
- ☐  $|2a + b| - |a + b|$
- ☐  $a^2 + b^2 - 2|ab|$
- ☐  $|a^3 + b^3| - a - b$

6.3053 A piece of wire is bent so as to form the boundary of a square with area  $A$ . If the wire is then bent into the shape of an equilateral triangle, what will be the area of the triangle thus bounded in terms of  $A$ ?

- ☐  $\frac{\sqrt{3}}{64} A^2$
- ☐  $\frac{\sqrt{3}}{4} A$
- ☐  $\frac{9}{16} A$
- ☐  $\frac{3}{4} A$
- ☐  $\frac{4\sqrt{3}}{9} A$

7.3044  $\sqrt{\frac{1}{3^0 + 3^{-1} + 3^{-2} + 3^{-3} + 3^{-4}}} =$

- ☐  $\frac{1}{11}$
- ☐  $\frac{9}{11}$
- ☐  $\frac{11}{9}$
- ☐ 11
- ☐  $3^{10}$

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8.3042 The Italian size of a suit jacket is  $N$  centimeters, where  $N$  is the linear distance between the armpits. The American size of a suit jacket is  $2.5P$  centimeters, where  $2.5P$  is twice the linear distance between the armpits. If, for a particular jacket,  $N = P + 10$ , which of the following is closest to the value of  $N$ ?

- ☐ 36
- ☐ 47
- ☐ 58
- ☐ 65
- ☐ 72

9.3037 Bill has a set of 6 black cards and a set of 6 red cards. Each card has a number from 1 through 6, such that each of the numbers 1 through 6 appears on 1 black card and 1 red card. Bill likes to play a game in which he shuffles all 12 cards, turns over 4 cards, and looks for pairs of cards that have the same value. What is the chance that Bill finds at least one pair of cards that have the same value?

- ☐ 8/33
- ☐ 62/165
- ☐ 17/33
- ☐ 103/165
- ☐ 25/33

10.3036 Each light bulb at [HOTEL](#) California is either incandescent or fluorescent. At a certain moment, forty percent of the incandescent bulbs are switched on, and ninety percent of the fluorescent bulbs are switched on. If eighty percent of all the bulbs are switched on at this moment, what percent of the bulbs that are switched on are incandescent?

- ☐ 22 (2/9)%
- ☐ 16 (2/3)%
- ☐ 11 (1/9)%
- ☐ 10%
- ☐ 5%

11.3031 Which of the following lists has the third largest standard deviation?

- ☐ {1, 2, 3, 4, 5}
- ☐ {2, 3, 3, 3, 4}
- ☐ {2, 2, 3, 3, 5}
- ☐ {1, 2, 3, 4, 6}

- ☐ {1, 3, 4, 5, 7}

12.3030A cylindrical tank has a base with a circumference of  $4\sqrt{3}\pi$  meters and an isosceles right triangle painted on the interior side of the base. A grain of sand is dropped into the tank, and has an equal probability of landing on any particular point on the base. If the probability of the grain of sand landing on the portion of the base outside the triangle is  $3/4$ , what is the length of a side of the triangle?

- ☐ 3
- ☐ 12
- ☐  $\sqrt{2}$
- ☐  $\sqrt{3}$
- ☐  $\sqrt{6}$

13.3014A triangle in the  $xy$ -coordinate plane has vertices with coordinates  $(7, 0)$ ,  $(0, 8)$ , and  $(20, 10)$ . What is the area of this triangle?

- ☐ 72
- ☐ 80
- ☐ 87
- ☐ 96
- ☐ 100

14.3005Two teams are distributing information booklets. Team A distributes 60% more boxes of booklets than Team B, but each box of Team A's has 60% fewer booklets than each box of Team B's. Which of the following could be the total number of booklets distributed by the two groups?

- ☐ 2,000
- ☐ 3,200
- ☐ 4,100
- ☐ 4,800
- ☐ 4,900

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15.3003A driver paid  $n$  dollars for auto insurance for the year 1997. This annual premium was raised by  $p$  percent for the year 1998; for each of the years 1999 and 2000, the premium was decreased by  $1/6$  from the previous year's figure. If the driver's insurance premium for the year 2000 was again  $n$  dollars, what is the value of  $p$ ?

- ☐ 12
- ☐  $33\frac{1}{3}$
- ☐ 36
- ☐ 44
- ☐ 50

16.3002The entire exterior of a large wooden cube is painted red, and then the cube is sliced into  $n^3$  smaller cubes (where  $n > 2$ ). Each of the smaller cubes is identical. In terms of  $n$ , how many of these smaller cubes have been painted red on at least one of their faces?

- ☐  $6n^2$
- ☐  $6n^2 - 12n + 8$
- ☐  $6n^2 - 16n + 24$
- ☐  $4n^2$
- ☐  $24n - 24$

17.2997  $6, y, y + 6, 6 - 4y, 6y, 2y$

For the set of terms shown above, if the mean of the set equals 10 then, in terms of  $y$ , the median must be

- ☐  $\frac{y + 6}{2}$
- ☐  $y + 3$
- ☐  $y$
- ☐  $\frac{3y}{2}$
- ☐  $y + 2$

18.2996A farmer has an apple orchard consisting of Fuji and Gala apple trees. Due to high winds this year 10% of his trees cross pollinated, creating trees that are part Fuji and part Gala. The number of his trees that are pure Fuji plus the number that are part Fuji and part Gala totals 187, while  $3/4$  of all his trees are pure Fuji. How many of his trees are pure Gala?

- ☐ 22
- ☐ 33
- ☐ 55
- ☐ 77

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☐ 88

19.2993 Two musicians, Maria and Perry, work at independent constant rates to tune a warehouse full of instruments. If both musicians start at the same time and work at their normal rates, they will complete the **JOB IN** 45 minutes. However, if Perry were to work at twice Maria's rate, they would take only 20 minutes. How long would it take Perry, working alone at his normal rate, to tune the warehouse full of instruments?

☐ 1 hr 20 min

☐ 1 hr 45 min

☐ 2 hr

☐ 2 hr 20 min

☐ 3 hr

20.2992 Pascal has 96 miles remaining to complete his cycling trip. If he reduced his current speed by 4 miles per hour, the remainder of the trip would take him 16 hours longer than it would if he increased his speed by 50%. What is his current speed?

☐ 6

☐ 8

☐ 10

☐ 12

☐ 16