Manhattan Challenge Questions

Manhattan GMAT

February 10, 2014

Contents

I Questions 2

1 Questions 1 - 20 3

2 Questions 21 - 40 9

3 Questions 41 - 60 14

II Answers 19

Part I

Questions

Chapter 1

Questions 1 - 20

Question 1: Is $\sqrt{x}$ a prime number? (20/5/2002)

1. $|3x - 7| = 2x + 2$
2. $x^2 = 9x$

Question 2: $\sqrt{24 + 5\sqrt{23}} + \sqrt{24 - 5\sqrt{23}}$ =? (27/5/2002)

(A) 48

(B) $\sqrt{24}$

(C) 1

(D) $5\sqrt{2}$

(E) $24 - 25\sqrt{23}$

Question 3: If P, Q, R and S are positive integers, and $\frac{P}{Q} = \frac{R}{S}$, is R divisible by 5? (3/6/2002)

1. P is divisible by 170
2. $Q = 7^x$, where x is a positive integer

Question 4: In a 4 person race, medals are awarded to the fastest 3 runners. The first-place runner receives a gold medal, the second-place runner receives a silver medal, and the third-place runner receives a bronze medal. In the event of a tie, the tied runners receive the same color medal. (For example, if there is a two-way tie for first-place, the top two runners receive gold medals, the next-fastest runner receives a silver medal, and no bronze medal is awarded). Assuming that exactly three medals are awarded, and that the three medal winners stand together with their medals to form a victory circle, how many different victory circles are possible? (10/6/2002)

(A) 24

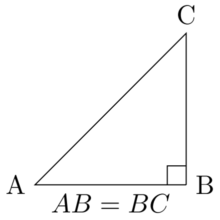
(B) 52

(C) 96

(D) 144

(E) 648

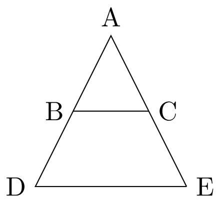
Question 5: Greg and Brian are both at Point A. Starting at the same time, Greg drives to point B while Brian drives to point C. Who arrives at his destination first? (17/6/2002)



1. Greg's average speed is $\frac{2}{3}$ that of Brian's
2. Brian's average speed is 20 miles per hour greater than Greg's.

Question 6: Set A, Set B, and Set C each contain only positive integers. If Set A is composed entirely of all the members of Set B plus all the members of Set C, is the median of Set B greater than the median of Set A? (24/6/2002)

1. The mean of Set A is greater than the median of Set B.
2. The median of Set A is greater than the median of Set C.



Question 7: In the figure above, AC = 3, CE = x, and BC is parallel to DE. If the area of triangle ABC is $\frac{1}{12}$ the area of triangle ADE, then x = ? (1/7/2002)

(A) $6 + 2\sqrt{3}$

(B) $12\sqrt{3} + 3$

(C) 33

(D) $10\sqrt{2}$

(E) $6\sqrt{3} - 3$

Question 8: Kate and Danny each have \$10. Together, they flip a fair coin 5 times. Every time the coin lands on heads, Kate gives Danny \$1. Every time the coin lands on tails, Danny gives Kate \$1. After the five coin flips, what is the probability that Kate has more than \$10 but less than \$15? (8/7/2002)

(A) $\frac{5}{16}$

(B) $\frac{1}{2}$

(C) $\frac{12}{30}$

(D) $\frac{15}{32}$

(E) $\frac{3}{8}$

Question 9: At Supersonic Corporation, the time required for a machine to complete a job is determined by the formula:

$$t = \sqrt{w} + \sqrt{w-1}$$

where w = the weight of the machine in pounds and t = the hours required to complete the job. If machine A weighs 8 pounds, and machine B weighs 7 pounds, how many hours will it take the two machines to finish one job if they work together? (15/7/2002)

(A) $\frac{6}{7-\sqrt{3}}$

(B) $\frac{1}{2}(\sqrt{8}+\sqrt{6})$

(C) $\frac{1}{3}(\sqrt{6}-\sqrt{3})$

(D) $3(\sqrt{3}+\sqrt{2})$

(E) $\sqrt{8}+2\sqrt{7}+\sqrt{6}$

Question 10: What is the units digit of the solution to $177^{28} - 133^{23}$? (22/7/2002)

(A) 1

(B) 3

(C) 4

(D) 6

(E) 9

Question 11: For a circle with center point P, chord XY is the perpendicular bisector of radius AP (A is a point on the edge of the circle). What is the length of cord XY? (29/7/2002)

1. The circumference of circle P is twice the area of circle P.
2. The length of Arc XAY $= \frac{2\pi}{3}$

Question 12: The measures of the interior angles in a polygon are consecutive integers. The smallest angle measures 136 degrees. How many sides does this polygon have? (5/8/2002)

(A) 8

(B) 9

(C) 10

(D) 11

(E) 13

Question 13: $\sqrt{ABC} = 504$. If A, B and C are all positive integers, is B divisible by 2? (12/8/2002)

1. C = 168
2. A is a perfect square

Question 14: The organizers of a week-long fair have hired exactly five security guards to patrol the fairgrounds at night for the duration of the event. Exactly two guards are assigned to patrol the grounds every night, with no guard assigned consecutive nights. If the fair begins on a Monday, how many different pairs of guards will be available to patrol the fairgrounds on the following Saturday night? (19/8/2002)

(A) 9

(B) 7

(C) 5

(D) 3

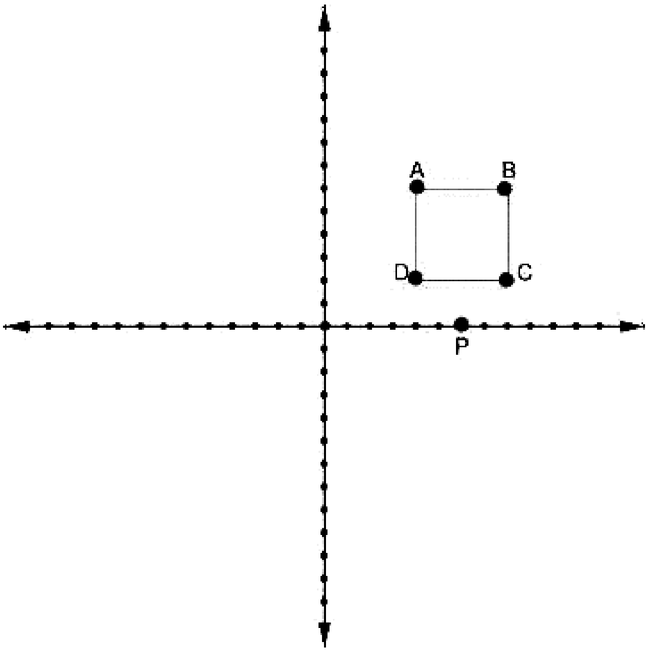
(E) 2

Question 15: (26/8/2002)
Point $K = (A, 0)$
Point $G = (2A + 4, \sqrt{2A + 9})$
Is the distance between point K and G prime?

1. $A^2 - 5A - 6 = 0$
2. $A > 2$

Question 16: In the game Cako, a player is awarded one tick for every third Alb captured, and one click for every fourth Berk captured. The total score is equal to the product of clicks and ticks. If a player has a score of 77, how many Albs did he capture? (2/9/2002)

1. The difference between Albs captured and Berks captured is 7.
2. The number Albs captured is divisible by 5.



Question 17: A certain computer program randomly generates equations of lines in the form $y = mx + b$. If point P is a point on a line generated by this program, what is the probability that the line does NOT pass through figure ABCD? (9/9/2002)

(A) 3/4

(B) 3/5

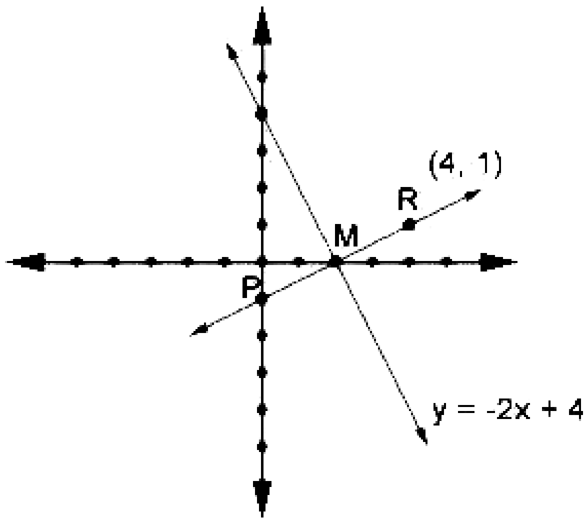
(C) 1/2

(D) 2/5

(E) 1/4

Question 18: (16/9/2002) $8xy^3 + 8x^3y = \dfrac{2x^2y^2}{2^{-3}}$. What is xy?

1. $y > x$
2. $x < 0$



Question 19: The line represented by the equation $y = 4 - 2x$ is the perpendicular bisector of line segment RP. If R has the coordinates $(4, 1)$, what are the coordinates of point P? (23/9/2002)

(A) $(-4, 1)$

(B) $(-2, 2)$

(C) $(0, 1)$

(D) $(0, -1)$

(E) $(2, 0)$

Question 20: Given that n is an integer, is $n - 1$ divisible by 3? (30/9/2002)

1. $n^2 + n$ is not divisible by 3
2. $3n + 5 \geq k + 8$, where k is a positive multiple of 3

Chapter 2

Questions 21 - 40

Question 21: A Trussian's weight, in keils, can be calculated by taking the square root of his age in years. A Trussian teenager now weighs three keils less than he will seventeen years after he is twice as old as he is now. How old is he now? (7/10/2002)

(A) 14

(B) 15

(C) 16

(D) 17

(E) 18

Question 22: There are y different travelers who each have choice of vacationing at one of n different destinations. What is the probability that all y travelers will end up vacationing at the same destinations? (14/10/2002)

(A) $\frac{1}{n!}$

(B) $\frac{n}{n!}$

(C) $\frac{1}{n^y}$

(D) $\frac{1}{n^{y-1}}$

(E) $\frac{n}{y^n}$

Question 23: Train A leaves New York for Boston at 3 PM and travels at the constant speed of 100 mph. An hour later, it passes Train B, which is making the trip from Boston to New York at a constant speed. If Train B left Boston at 3:50 PM and if the combined travel time of the two trains is 2 hours, what time did Train B arrive in New York? (21/10/2002)

1. Train B arrived in New York before Train A arrived in Boston.
2. The distance between New York and Boston is greater than 140 miles.

Question 24: The function $f(n)$ = the number of factors of n. If $f(pq) = 4$, what is the value of the integer p? (28/10/2002)

1. $p + q$ is an odd integer
2. $q < p$

Question 25: Larry, Michael, and Doug have five donuts to share. If any one of the men can be given any whole number of donuts from 0 to 5, in how many different ways can the donuts be distributed? (4/11/2002)

(A) 21

(B) 42

(C) 120

(D) 504

(E) 5040

Question 26: A new cell phone plan is offering pricing based on average monthly use. Brandon and Jodie are comparing their average use to determine the best plan for them. Brandon's average monthly usage in 2001 was q minutes. Was this less than, greater than, or equal to Jodie's 2001 average monthly usage, in minutes? (11/11/2002)

1. From January to August 2001, Jodie's average monthly usage was $1.5q$ minutes.
2. From April to December 2001, Jodie's average monthly usage was $1.5q$ minutes.

Question 27: There is a 10% chance that it won't snow all winter long. There is a 20% chance that schools will not be closed all winter long. What is the greatest possible probability that it will snow and schools will be closed during the winter? (18/11/2002)

(A) 55%

(B) 60%

(C) 70%

(D) 72%

(E) 80%

Question 28: Is $xy + xy < xy$? (25/11/2002)

1. $\frac{x^2}{y} < 0$
2. $x^9(y^3)^3 < (x^2)^4(y^8)$

Question 29: If x represents the sum of all the positive three-digit numbers that can be constructed using each of the distinct nonzero digits a, b, and c exactly once, what is the largest integer by which x must be divisible? (2/12/2002)

(A) 3

(B) 6

(C) 11

(D) 22

(E) 222

Question 30: x years ago, Cory was one fifth as old as Tania. In x years, Tania will be twice as old as Cory. What is the ratio of Cory's current age to Tania's current age? (9/12/2002)

(A) 7:23

(B) 9:17

(C) 5:13

(D) 3:7

(E) 11:15

Question 31: What is the value of the integer n? (16/12/2002)

1. $n! = n \times (n-1)!$
2. $n^3 + 3n^2 + 2n$ is divisible by 3

Question 32: The maitre 'd at an expensive Manhattan restaurant has noticed that 60% of the couples order dessert and coffee. However, 20% of the couples who order dessert don't order coffee. What is the probability that the next couple the maitre 'd seats will not order dessert? (23/12/2002)

(A) 20%

(B) 25%

(C) 40%

(D) 60%

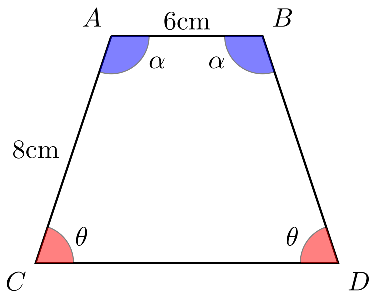
(E) 75%

Question 33: If $r - s = 3p$, is p an integer? (30/12/2002)

1. r is divisible by 735
2. $r + s$ is divisible by 3

Question 34: Given that a, b, c, and d are non-negative integers, is the fraction $\frac{ad}{2^a 3^b 4^c 5^d}$ a terminating decimal? (6/1/2003)

1. $d = \frac{(1+a)(a^2-2a+1)}{(a-1)(a^2-1)}$
2. $b = (1+a)(a^2-2a+1) - (a-1)(a^2-1)$



Question 35: What is the area of the trapezoid pictured above? (13/1/2003)

1. $\measuredangle A = 120°$
2. The perimeter of trapezoid $ABCD = 36$

Question 36: For a three-digit number xyz, where x, y, and z are the digits of the number, $f(xyz) = 5^x 2^y 3^z$. If $f(abc) = 3 * f(def)$, what is the value of $abc - def$? (20/1/2003)

(A) 1

(B) 2

(C) 3

(D) 9

(E) 27

Question 37: If $\frac{n^2}{n}$ yields an integer greater than 0, is n divisible by 30? (27/1/2003)

1. n^2 is divisible by 20
2. n^3 is divisible by 12

Question 38: If $\dfrac{3(ab)^3 + 9(ab)^2 - 54ab}{(a-1)(a+2)} = 0$, and a and b are both non-zero integers, which of the following could be the value of b? (3/2/2003)

I. 2

II. 3

III. 4

(A) I only

(B) II only

(C) I and II only

(D) I and III only

(E) I, II and III

Question 39: Nina and Teri are playing a dice game. Each girl rolls a pair of 12-sided dice, numbered with the integers from -6 through 5, and receives a score that is equal to the negative of the sum of the two die. (E.g., If Nina rolls a 3 and a 1, her sum is 4, and her score is -4.) If the player who gets the highest score wins, who won the game? (10/2/2003)

1. The value of the first die Nina rolls is greater than the sum of both Teri's rolls.
2. The value of the second die Nina rolls is greater than the sum of both Teri's rolls.

Question 40: A small, experimental plane has three engines, one of which is redundant. That is, as long as two of the engines are working, the plane will stay in the air. Over the course of a typical flight, there is a 1/3 chance that engine one will fail. There is a 75% probability that engine two will work. The third engine works only half the time. What is the probability that the plane will crash in any given flight? (17/2/2003)

(A) 7/12

(B) 1/4

(C) 1/2

(D) 7/24

(E) 17/24

Chapter 3

Questions 41 - 60

Question 41: If x and y are unknown positive integers, is the mean of the set $\{6, 7, 1, 5, x, y\}$ greater than the median of the set? (24/2/2003)

1. $x + y = 7$
2. $x - y = 3$

Question 42: A certain series is defined by the following recursive rule: $S_n = k(S_{n-1})$, where k is a constant. If the 1st term of this series is 64 and the 25th term is 192, what is the 9th term? (3/3/2003)

(A) $\sqrt{2}$

(B) $\sqrt{3}$

(C) $64\sqrt{3}$

(D) $64\sqrt[3]{3}$

(E) $64\sqrt[24]{3}$

Question 43: Sammy has x flavors of candies with which to make goody bags for Frank's birthday party. Sammy tosses out y flavors, because he doesn't like them. How many different 10-flavor bags can Sammy make from the remaining flavors? (It doesn't matter how many candies are in a bag, only how many flavors). (10/3/2003)

1. If Sammy had thrown away 2 additional flavors of candy, he could have made exactly 3,003 different 10-flavor bags.
2. $x = y + 17$

Question 44: If a and b are consecutive positive integers, and $ab = 30x$. Is x a non-integer? (17/3/2003)

1. a^2 is divisible by 21
2. 35 is a factor of b^2

Question 45: If $3x - 2y - z = 32 + z$ and $\sqrt{3x} - \sqrt{2y + 2z} = 4$, what is the value of $x + y + z$? (24/3/2003)

(A) 3

(B) 9

(C) 10

(D) 12

(E) 14

Question 46: A woman has seven cookies – four chocolate chip and three oatmeal. She gives one cookie to each of her six children: Nicole, Ronit, Kim, Deborah, Mark, and Terrance. If Deborah will only eat the kind of cookie that Kim eats, in how many different ways can the cookies be distributed?
(The leftover cookie will be given to the dog.) (31/3/2003)

(A) 5040

(B) 50

(C) 25

(D) 15

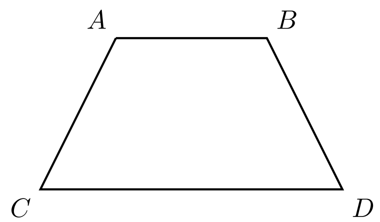
(E) 12

Question 47: Triangle A has one side of length x. If $\sqrt{x^8} = 81$, what is the perimeter of Triangle A (7/4/2003)

1. Triangle A has sides whose lengths are consecutive integers
2. Triangle A is NOT a right triangle

Qeustion 48: Chandra and Ken are waiting in line for concert tickets. If each person takes up 2 feet of space in the line, how long is the line? (14/4/2003)

1. There are three people in front of Chandra and three people behind Ken
2. Two people are standing between Chandra and Ken



Question 49: The height of isosceles trapezoid $ABDC$ is 12 units. The length of diagonal AD is 15 units. What is the area of trapezoid $ABDC$? (21/4/2003)

(A) 72

(B) 90

(C) 96

(D) 108

(E) 180

Question 50: Stephanie, Regine, and Brian ran a 20 mile race. Stephanie and Regine's combined times exceeded Brian's time by exactly 2 hours. If nobody ran faster than 8 miles per hour, who could have won the race? (28/4/2003)

I. Stephanie II. Regine III. Brian

(A) I only

(B) II only

(C) III only

(D) I or II only

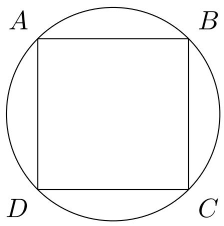
(E) I, II or III

Question 51: Mike recently wont a contest in which he will have the opportunity to shoot free throws in order to win $10,000. In order to win the money Mike can either shoot 1 free throw and make it, or shoot 3 free throws and make at least 2 of them. Mike occasionally makes shots and occasionally misses shots. He knows that his probability of making a single free throw is p, and that this probability doesn't change. Would Mike have a better chance of winning if he chose to attempt 3 free throws? (5/5/2003)

1. $p < 0.7$
2. $p > 0.6$

Question 52: What is the three-digit number abc, given that a, b, and c are the positive single digits that make up the number? (12/5/2003)

1. $a = 1.5b$ and $b = 1.5c$
2. $a = 1.5x + b$ and $b = x + c$, where x represents a positive single digit



Question 53 $ABCD$ is a square inscribed in a circle and arc ADC has a length of $\pi(\sqrt{x})$. If a dart is thrown and lands somewhere in the circle, what is the probability that it will not fall within the inscribed square? (Assume that the point in the circle where the dart lands is completely random.) (19/5/2003)

(A) $2x$

(B) $\pi(x) - 2x$

(C) $\pi(x) - \sqrt{2}(x)$

(D) $1 - \dfrac{2}{\pi}$

(E) $1 - \dfrac{2}{x}$

Question 54: x and y are positive integers. If $5^x - 5^y = (2^{y-1})(5^{x-1})$, what is the value of xy? (26/5/2003)

(A) 48

(B) 36

(C) 24

(D) 18

(E) 12

Question 55: Ms. Barton has four children. You are told correctly that she has at least two girls but you are not told which two of her four children are those girls. What is the probability that she also has two boys? (Assume that the probability of having a boy is the same as the probability of having a girl.) (2/6/2003)

(A) 1/4

(B) 3/8

(C) 5/11

(D) 1/2

(E) 6/11

Question 56: Given a series of n consecutive positive integers, where $n > 1$, is the average value of this series an integer divisible by 3? (9/6/2003)

1. n is odd
2. The sum of the first number of the series and $\frac{n-1}{2}$ is an integer divisible by 3

Question 57: In the game of Funball, each batter can either hit a home run, hit a single, or strikeout, and the likelihood of each outcome is completely determined by the opposing pitcher. A Funball batter scores a point for their team by advancing sequentially through each of four "bases", according to the following rules:

Home run: The batter and any players already on a base advance through all four bases.
Single: The batter advances to first base, and any players already on a base advance one base each.
Strikeout: No one advances any bases, and the batter loses his/her turn.
If the batting team has a runner on first base, which pitcher (Roger or Greg) is more likely to allow a point before recording a strikeout?(16/6/2003)

1. Greg is twice as likely as Roger to allow a single, and four times as likely as Roger to record a strikeout.
2. Greg is twice as likely as Roger to allow a single, and one fourth as likely as Roger to allow a home run.

Question 58: Which of the following sets includes ALL of the solutions of x that will satisfy the equation: $|x-2|-|x-3|=|x-5|$? (23/6/2003)

(A) $\{-6,-5,0,1,7,8\}$

(B) $\{-4,-2,0,\frac{10}{3},4,5\}$

(C) $\{-4,0,1,4,5,6\}$

(D) $\{-1,\frac{10}{3},3,5,6,8\}$

(E) $\{-2,-1,1,3,4,5\}$

Question 59: How many different combinations of outcomes can you make by rolling three standard (6-sided) dice if the order of the dice does not matter? (30/6/2003)

(A) 24

(B) 30

(C) 56

(D) 120

(E) 216

Question 60: x_1 and x_2 are each positive integers. When x_1 is divided by 3, the remainder is 1, and when x_2 is divided by 12, the remainder is 4. If $y=2x_1+x_2$, then what must be true about y? (7/7/2003)

I. y is even

II. y is odd

III. y is divisible by 3

(A) I only

(B) II only

(C) III only

(D) I and III only

(E) II and III only

Part II

Answers

1. C	16. A	31. E	46. D
2. D	17. C	32. B	47. C
3. C	18. A	33. C	48. E
4. B	19. D	34. B	49. D
5. A	20. A	35. D	50. D
6. E	21. C	36. A	51. B
7. E	22. D	37. C	52. A
8. D	23. D	38. A	53. D
9. B	24. E	39. E	54. E
10. C	25. A	40. D	55. E
11. D	26. B	41. A	56. B
12. B	27. E	42. D	57. A
13. C	28. E	43. D	58. C
14. D	29. E	44. C	59. C
15. C	30. C	45. E	60. D