Quant Mastery A

Session Booklet

1. Nancy works 3 days per week at a rate of x dollars per day. If Nancy works more than 3 days per week, any extra days are paid at double her normal rate. Nancy worked 4 weeks with no overtime, and then worked 3 more weeks, each with y days of overtime. Which of the following represents Nancy's total earnings over this period?

   - ○ $3y(7x + 2xy)$
   - ○ $3x + 12y$
   - ○ $3xy(7x + 2)$
   - ○ $3x(2y + 7)$
   - ○ $4x(y + 8)$

2. If $5^{8y + 14} = 125^{4y - 14}$, then what is the value of y?

   - ○ -14
   - ○ -8
   - ○ 8
   - ○ 14
   - ○ 32

3. If b is an integer, is $a|a| < 2^b$?

   (1) $b < 0$
   (2) $a = b$

4. If $(x^2 + 8)yz < 0$, $wz > 0$, and $xyz < 0$, then which of the following must be true?

   I. $x < 0$
   II. $wy < 0$
   III. $yz < 0$

   - ○ II only
   - ○ III only
   - ○ I and III only
   - ○ II and III only
   - ○ I, II, and III

5. For a bake sale, Simon baked $2n$ more pies than Theresa. Theresa baked half as many pies as Roger, who baked $\frac{1}{3}n$ pies. No other pies were baked for the sale. What fraction of the total pies for sale did Roger bake?

   - ○ $\frac{1}{16}$
   - ○ $\frac{1}{8}$
   - ○ $\frac{3}{16}$
   - ○ $\frac{3}{8}$
   - ○ $\frac{13}{16}$

6. If p is an even integer, and q and r are odd integers, then which of the following CANNOT be an odd integer?

   ○ $\frac{p + q}{r}$

   ○ $\frac{q - r}{p}$

   ○ $\frac{q}{p + r}$

   ○ $\frac{q}{r} + p$

   ○ $\frac{pq}{r} + pr$

7. Yogurt containers come in 4 different sizes. A grocery store currently has 20 yogurt containers, which have an average size of 7.4 ounces. If there are 7 containers of 4 ounces each and 3 containers of 10 ounces each, and half of the remaining containers contain x ounces of yogurt each while the other half contain $2x$ ounces of yogurt each, what is the value of x?

   ○ 5

   ○ 6

   ○ 8

   ○ 12

   ○ 15

8. What is the value of x?

   (1) $3x^2 - 8x - 35 = 0$
   (2) $x^2 - 3x = 7x - 25$

9. m and n are both integers, and $m \neq n$. Does $n = 0$?

   (1) $m = 7$
   (2) $mn = n^2$

10. When a computer is rented from store X, there is an initial fee of $80 and an additional rate of $20 per day. When a computer is rented from store Y, there is an initial fee of $180 and a daily computer rental rate of $17. If the cost of renting a computer for n days from store Y is 125% of the cost of renting from store X, what is the value of n?

- ○ 5
- ○ 8
- ○ 10
- ○ 13
- ○ 25

11. For all real numbers a and b, the operation Ω is defined by $a \ \Omega \ b = a^2 + ab$. If $y = x \ \Omega \ 8$, and $3 \ \Omega \ y = -12$, then what is the sum of the squares of all possible values of x?

- ○ 25
- ○ 29
- ○ 36.5
- ○ 50
- ○ 73

12. Is $x > 3$?

    (1) $5^y > 25^8$ and $y = x^2$.

    (2) $2^{15x} > (8^{4x})(8)$

13. x and y are positive integers. Is $\sqrt{x}\sqrt{y}$ an integer?

    (1) $\frac{x}{y} = \frac{1}{n^2}$, where n is a positive integer.

    (2) $\sqrt[3]{x}\ \sqrt[3]{y}$ is the square of an integer.

14. Which of the following represents all the possible values of x that are solutions to the equation $5x = |x^2 - 6|$?

    ○ -3, -2, and 0

    ○ -6, -1, 1, and 6

    ○ -6 and 1

    ○ 2 and 3

    ○ 1 and 6

15. Is $y > -4$?

    (1) $\left(\frac{1}{7}\right)^{4y} > \left(\frac{1}{7}\right)^{8y + 14}$

    (2) $4y^2 + 12y < 0$

16. Betty has 4 times the number of stamps that Cathy does, and Anne has 6 stamps more than Cathy does. If Betty, Cathy, and Anne each increase their number of stamps by 5, which of the following must be true after each person increases her number of stamps?

    I. Betty has more stamps than Anne.

    II. Anne has 3 more stamps than Cathy.

    III. The sum of the numbers of stamps that Betty and Cathy have is a multiple of 5.

    ○ None
    ○ III only
    ○ I and III only
    ○ II and III only
    ○ I, II, and III

17. Is x^3 an integer?

    (1) x^2 is an integer.

    (2) The product of $x^3 + \sqrt{7}$ and $x^3 - \sqrt{7}$ is an integer.

18. If a, b, and c are integers such that $0 < a < b < c$, and a is even, b is prime, and c is odd, which of the following is a possible value for abc?

    ○ 5
    ○ 12
    ○ 15
    ○ 33
    ○ 54

19. The integers x and y are positive, $x > y + 8$, and $y > 8$. If the remainder when $x + y$ is divided by 8 is 7, and the remainder when $x - y$ is divided by 8 is 5, then what is the remainder when $x^2 - y^2$ is divided by 8?

    ○ 3
    ○ 4
    ○ 5
    ○ 6
    ○ 7

20. On a number line, point A represents 12, point B represents x, and point C represents 24, where $12 < x < 24$. Is the distance from point A to point B less than half the distance from point B to point C?

    (1) $x < 17$

    (2) $7x + 4 < 3x + 60$

21. The integers a, b, and c are prime numbers, and $a < b < c$. If $y = a^2bc$, then how many non-prime positive integer factors greater than 1 does y have?

    ○ 4
    ○ 7
    ○ 8
    ○ 10
    ○ 12

22. If $abc \neq 0$, is $a > 0$?

    (1) $\frac{3a}{b} > 0$

    (2) $\frac{b}{c^2} < 0$

23. Is the integer y a multiple of 4?

    (1) $3y^2$ is a multiple of 18.
    (2) $y = \frac{p}{q}$, where p is a multiple of 12 and q is a multiple of 3.

24. What is the value of $7x + 3y$?

    (1) $56x + 24y = 520$
    (2) $8x + 5y = 79$ and $40x + 25y = 395$