

**Federal State Autonomous Institution for Higher Education
National Research University Higher School of Economics
St. Petersburg Branch
St. Petersburg School of Economics and Management
Master Programme “Finance”**

Preliminary tests

1 (3 points)

If p is the product of the integers from 1 to 30, inclusive, what is the greatest integer k for which 3^k is a factor of p ?

- A. 10
- B. 12
- C. 14
- D. 16
- E. 18

Answer: C.

2 (5 points)

How many prime numbers between 1 and 100 are factors of 7,150?

- A. One
- B. Two
- C. Three
- D. Four
- E. Five

Answer: D.

3 (3 points)

If x is a positive integer, what is the remainder when $7^{12x+3} + 3$ is divided by 5?

- A 0
- B 1

C 2

D 3

E 4

Answer: B.

4 (3 points)

For all positive integers m , $(m) = 3m$ when m is odd and $(m) = \frac{1}{2}m$ when m is even, which of the following is equivalent to $(9)*(6)$?

- A. 81
- B. 54
- C. 36
- D. 27
- E. 18

Answer: D

5 (3 points)

Each digit in the two-digit number G is halved to form a new two-digit number H . Which of the following could be the sum of G and H ?

- A. 153
- B. 150
- C. 137
- D. 129
- E. 89

Answer: D

6 (4 points)

For which of the following functions is $f(a+b)=f(b)+f(a)$ for all positive numbers a and b ?

- A. $f(x)=x^2$
- B. $f(x)=x+1$
- C. $f(x)=\sqrt{x}$

D. $f(x)=2/x$

E. $f(x)=-3x$

Answer: E.

7 (4 points)

The number 75 can be written as the sum of the squares of 3 different positive integers. What is the sum of these 3 integers?

A. 17

B. 16

C. 15

D. 14

E. 13

Answer: E

8 (3 points)

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?

(A) 24

(B) 52

(C) 96

(D) 144

(E) 648

Answer: B

9 (5 points)

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?

- (A) 24
- (B) 30
- (C) 56
- (D) 120
- (E) 216

Answer: C

10 (3 points)

Anthony and Michael sit on the six-member board of directors for company X. If the board is to be split up into 2 three-person subcommittees, what percent of all the possible subcommittees that include Michael also include Anthony?

- A. 20%
- B. 30%
- C. 40%
- D. 50%
- E. 60%

Answer: C

11 (5 points)

How many ways are there to award a gold, silver, and bronze medal to 10 contending teams?

- A. $10 \times 9 \times 8$
- B. $10! / 3! 7!$
- C. $10! / 3!$
- D. 360
- E. 300

Answer: A

12 (3 points)

A certain law firm consists of 4 senior partners and 6 junior partners. How many different groups of 3 partners can be formed in which at least one member of the group is a senior partner? (Two groups are considered different if at least one group member is different.)

- A. 48
- B. 100
- C. 120
- D. 288
- E. 600

Answer: B

13 (4 points)

A wheel of a car of radius 21 cms is rotating at 600 RPM. What is the speed of the car in km/hr?

- A. 79.2 km/hr
- B. 47.52 km/hr
- C. 7.92 km/hr
- D. 39.6 km/hr
- E. 3.96 km/hr

Answer: B

14 (5 points)

A lady grows cabbage in her garden that is in the shape of a square. Each cabbage takes 1 square foot of area in her garden. This year, she has increased her output by 211 cabbages when compared to last year. The shape of the area used for growing the cabbage has remained a square in both these years. How many cabbages did she produce this year?

- A. 11236
- B. 11025
- C. 14400
- D. 12696
- E. Cannot be determined

Answer: A

15 (5 points)

Rectangle ABCD is constructed in the xy-plane so that sides AB and CD are parallel to the x-axis. Both the x and y coordinates of all four vertices of the rectangle are integers. How many rectangles can be constructed if x and y coordinates satisfy the inequality $11 < x < 29$ and $5 \leq y \leq 13$?

- A. 153

- B. $153C_4$
- C. 4896
- D. 2448
- E. 5508

Answer: C

16 (5 points)

If a randomly selected non-negative single digit integer is added to set X {2, 3, 7, 8}, what is the probability that the median of the set will increase while its range will remain the same?

- (A) 20%
- (B) 30%
- (C) 40%
- (D) 50%
- (E) 60%

Answer is B

17 (5 points)

A certain list of 100 data has an average of 6 and a standard deviation of d , where d is positive. Which of the following pairs of data, when added to the list, must result in a list of 102 data with standard deviation less than d ?

- A. -6 and 0
- B. 0 and 0
- C. 0 and 6
- D. 0 and 12
- E. 6 and 6

Answer: E

18 (5 points)

	Median	Mean	StDev
Set A	X	Y	Z
Set B	L	M	N
Set [A + B]	Q	R	S

The table below represents three sets of numbers with their respective medians, means and standard deviations. The third set, Set [A+B], denotes the set that is formed by combining Set A and Set B.

If $X - Y > 0$ and $L - M = 0$, then which of the following must be true?

I. $Z > N$ II. $R > M$ III. $Q > R$

(A) I only

(B) II only

(C) III only

(D) I and II only

(E) None

Answer: E

19 (5 points)

Let Set $T = \{2, 4, 5, 7\}$. Which of the following values, if added to Set T, would most increase the standard deviation of Set T?

A. 1

B. 3

C. 6

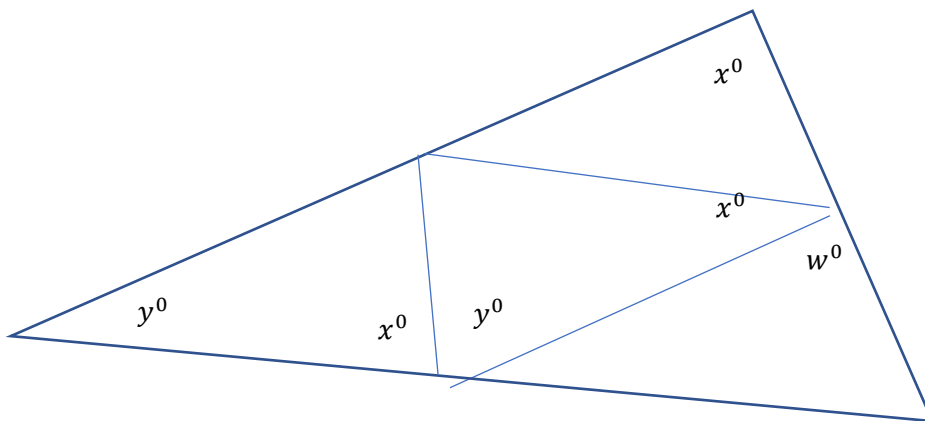
D. 8

E. 14

Answer: E

20 (3 points)

What is the value of w in terms of x and y ? Note: Figure not drawn to scale



A. $2x+2y-180$

B. $180-x-y$

C. $360-2x-2y$

D. $360-2x-3y$

E. $180+x-2y$

Answer: A.

21 (3 points)

If a and b are both positive integers, is $b^{a+1} - ba^b$ odd?

- (1) $a + (a + 4) + (a - 8) + (a + 6) + (a - 10)$ is odd
(2) $b^3 + 3b^2 + 5b + 7$ is odd

- A. Statement 1 ALONE is sufficient to answer the question, but statement 2 alone is NOT sufficient.
B. Statement 2 ALONE is sufficient to answer the question, but statement 1 alone is NOT sufficient.
C. BOTH statements 1 and 2 TOGETHER are sufficient to answer the question, but NEITHER statement ALONE is sufficient
D. Each statement ALONE is sufficient to answer the question.
E. Statement 1 and 2 TOGETHER are NOT sufficient to answer the question.

Answer: D

22 (5 points)

A certain portfolio consisted of 5 stocks, priced at \$20, \$35, \$40, \$45, and \$70, respectively. On a given day, the price of one stock increased by 15%, while the price of another stock decreased by 35% and the prices of the remaining three remained constant. If the average price of a stock in the portfolio rose by approximately 2%, which of the following could be the prices of the shares that remained constant?

- (A) \$20, \$35, and \$70
(B) \$20, \$45, and \$70
(C) \$20, \$35, and \$40
(D) \$35, \$40, and \$70
(E) \$35, \$40, and \$45

Answer: E

23 (4 points)

If y is greater than 110 percent of x , is y greater than 75?

(1) $x > 75$ (2) $y - x = 10$

- A. Statement 1 ALONE is sufficient to answer the question, but statement 2 alone is NOT sufficient.
- B. Statement 2 ALONE is sufficient to answer the question, but statement 1 alone is NOT sufficient.
- C. BOTH statements 1 and 2 TOGETHER are sufficient to answer the question, but NEITHER statement ALONE is sufficient
- D. Each statement ALONE is sufficient to answer the question.
- E. Statement 1 and 2 TOGETHER are NOT sufficient to answer the question.

Answer: A

24 (4 points)

Henry purchased 3 items during a sale. He received a 20 percent discount off the regular price of the most expensive item of a 10 percent discount off the regular price of each of the other 2 items. Was the total discount of these three items greater than 15 percent of the sum of the regular prices of the 3 items?

- (1) The regular price of the most expensive item was \$50, and the regular price of the next most expensive item was \$20
- (2) The regular price of the least expensive item was \$15

- A. Statement 1 ALONE is sufficient to answer the question, but statement 2 alone is NOT sufficient.
- B. Statement 2 ALONE is sufficient to answer the question, but statement 1 alone is NOT sufficient.
- C. BOTH statements 1 and 2 TOGETHER are sufficient to answer the question, but NEITHER statement ALONE is sufficient
- D. Each statement ALONE is sufficient to answer the question.
- E. Statement 1 and 2 TOGETHER are NOT sufficient to answer the question.

Answer: A

25 (3 points)

When Q is divided by W , the quotient is R and the remainder is E . Which of the following expressions is equal to E ?

$RW + Q$

$RW - Q$

$Q - RW$

$QW - R$

Q/RW

Answer: C