

PSAT Math Sections

- Section 2 – 20 multiple choice questions in 25 minutes.
- Section 4 – 8 multiple choice questions and 10 grid-ins in 25 minutes.
- All TI-nspire models allowed, but scientific calculators might be ideal.
- There is a guessing penalty for multiple choice questions. For every multiple choice question you get wrong, a quarter point is deducted.
- There is no penalty for incorrect answer on the grid-ins.
- There is a reference section for formulas for geometry in both math sections.
- While this test could qualify you as a National Merit Semi-finalist, it is only one test and should carry the weight of only one test.

Grid-in Section

1. If you need to grid-in less than 4 characters, you can grid them in anywhere.
2. Only the bubbles are scored, so be sure you bubble carefully.
3. You cannot have a negative answer.
-3 is always wrong
4. Convert all mixed numbers into improper fractions or decimals.
 $3\frac{1}{4}$ should be converted into $\frac{13}{4}$ or 3.25
5. You do not need to reduce fractions to their lowest terms.

$\frac{2}{4}$ is just as good as $\frac{1}{2}$

6. If a decimal is less than one, you do not need to start with a zero

.41 is just as good as 0.41

| | | | |
|---|---|---|---|
| | | | |
| | / | / | |
| . | . | . | . |
| | 0 | 0 | 0 |
| 1 | 1 | 1 | 1 |
| 2 | 2 | 2 | 2 |
| 3 | 3 | 3 | 3 |
| 4 | 4 | 4 | 4 |
| 5 | 5 | 5 | 5 |
| 6 | 6 | 6 | 6 |
| 7 | 7 | 7 | 7 |
| 8 | 8 | 8 | 8 |
| 9 | 9 | 9 | 9 |

The first two questions refer to the following definition.

For any integers m and n , $m * n$ represents the remainder when m is divided by n .

1. What is the value of $6 * 1 + 6 * 2 + 6 * 3 + 6 * 4 + 6 * 5 + 6 * 6$?

- A) 0 B) 3 C) 6 D) 9 E) 14

2. If $a < b$, what is the maximum possible value of $a * b + b * a$?

- A) $a + b$ B) $ab - 1$ C) $2a - 1$ D) $2b - 1$ E) $a + b - 1$

3. If p , q , and r are distinct prime numbers greater than 5, which of the following could be true?

- I. $p - q$ is prime II. $p + q$ is prime III. $p + q + r$ is prime

A) I only B) II only C) I and II only D) I and III only E) I, II, and III

4. If r , s , and t are prime numbers less than 15, what is the greatest possible value of $\frac{r-s}{t}$?

5. A lottery prize worth d dollars was to be divided equally among 4 winners. It was subsequently discovered that there were 2 additional winners, and the prize would now be equally divided among all of the winners. How much more money, in dollars, would each original winner have received if the additional winners were not discovered?

A) $\frac{d}{12}$

B) $\frac{d}{6}$

C) $\frac{d}{4}$

D) $\frac{12}{d}$

E) $\frac{6}{d}$

6. There are twice as many girls as boys in a science class. If 30% of the girls and 45% of the boys have already completed their lab reports, what percent of the students have not yet finished their reports?



7 (Old PSAT question). On the number line above, the tick marks are equally spaced. Which of the following expresses y in terms of x ?

- A) $x+2$ B) $2x+1$ C) $2x+2$ D) $3x-2$ E) $3x$

8. Evelyn's average on her six math tests this marking period is 80. Fortunately for Evelyn, her teacher drops each student's lowest grade; doing so raises Evelyn's average to 90. What was her lowest grade?

- A) 20 B) 25 C) 30 D) 40 E) 50

9. The day of a quiz, only Kenan was absent. The average grade of the other students was 85. When Kenan took a makeup quiz, his grade was 30, which lowered the class's average to 80. How many students are in the class?

- A) 8 B) 9 C) 10 D) 11 E) 12

10. If the arithmetic mean of five numbers is 95 and the arithmetic mean of three of them is 100, what is the arithmetic mean of the other two?

11. Twenty-five students took a quiz, and the grades they earned ranged from 2 to 10. If exactly 22 of them passed by earning a grade of 7 or higher, what is the highest possible average the class could have earned on the quiz?

12. Each of the 15 members of a club owns a certain number of teddy bears. The following chart shows the number of teddy bears owned.

| Number of Teddy Bears | Number of Members |
|-----------------------|-------------------|
| 6 | 2 |
| 8 | 5 |
| 10 | 4 |
| 13 | 4 |

What is the average of the median and the mode of this set of data?

- A) 4.5 B) 8 C) 8.5 D) 9 E) 9.5

13. If a , b , c , and d are four consecutive integers, which of the following could be their arithmetic mean?

- I. 99 II. 99.5 III. 100

- A) I only B) II only C) I and II only D) II and III only E) I, II, and III

14 (Old PSAT question). The table shows the only five numbers that appear in the data set containing 91 numbers. It also shows the frequency with which each number appears in the data set. If 80 is the only mode and 88 is the median, what is the greatest possible value of y ?

| Number | Frequency |
|--------|-----------|
| 80 | x |
| 88 | y |
| 89 | 15 |
| 90 | 19 |
| 100 | 11 |

A) 26

B) 24

C) 23

D) 22

E) 20

15. A bag contains 4 red, 5 white, and 6 blue marbles. Sarah begins removing marbles from the bag at random, one at a time. What is the least number of marbles she must remove to be sure that she has at least one of each color?

A) 3

B) 6

C) 9

D) 12

E) 15

16. Sally wrote the number 1 on 1 slip of paper, the number 2 on 2 slips of paper, the number 3 on 3 slips of paper, the number 4 on 4 slips of paper, the number 5 on 5 slips of paper, and the number 6 on 6 slips of paper. All the slips of paper were placed in a bag, and Lana drew one slip at random. What is the probability that the number on the slip Lana drew was odd?

17 (Old PSAT question). A drawer contains 6 red socks, 6 white socks, 6 blue socks, and no other socks. If socks are selected at random from the drawer, what is the least number of socks that must be selected to ensure that two socks of the same color are selected?

A) 2

B) 3

C) 4

D) 6

E) 7

18. What is the 100th term of the sequence 4, 9, 14, 19, 24, ...?

- A) 494 B) 499 C) 504 D) 509 E) 514

19. Consider the sequence 2, 6, 18, 54, 162, ... What is the 25th term?

- A) 3^{24} B) 3^{25} C) $2 \cdot 3^{24}$ D) $2 \cdot 3^{25}$ E) 6^{24}

20. The first term of sequence I is 2 and each subsequent term is 2 more than the preceding term. The first term of sequence II is 2 and each subsequent term is 2 times the preceding term. What is the ratio of the 32nd term of sequence II to the 32nd term of sequence I?

- A) 1 B) 2 C) 2^{26} D) 2^{27} E) 2^{32}

21. If it is now September, what month will it be 555 months from now?

A) April B) June C) September D) November E) December

22. The first term of a sequence is 2. Starting with the second term, each term is 1 more than 2 times the preceding term. How many terms of this sequence are less than 100?

23. If Steven was born on Friday, August 13, 2010, and Daniel was born exactly 200 days later, on what day of the week was Daniel born?

A) Monday B) Tuesday C) Friday D) Saturday E) Sunday

24. The first two terms of a sequence are 1 and 2. Every other term in the sequence is the sum of the two terms immediately preceding it. For example, the third term is $1 + 2 = 3$ and the fourth term is $2 + 3 = 5$. How many of the first 100 terms are odd?

25 (old PSAT question). In the sequence $2, 12, 72, 432, \dots$, the first term is 2 and each term after is k times the preceding term, where k is constant. What is the value of the 52nd term divided by the 50th term?

1. The answer is 3, Choice B.
2. The answer is $2a - 1$, Choice C.
3. The answer is I and III only, Choice D.
4. The answer is $11\frac{1}{2}$ or 6.5, grid-in.
5. The answer is $\frac{d}{12}$, Choice A.
6. The answer is 65, grid-in.
7. The answer is $3x - 2$, Choice D.
8. The answer is 30, Choice C.
9. The answer is 11, Choice D.
10. The answer is 87.5, grid-in.
11. The answer is 9.36, grid-in.
12. The answer is 9, Choice D.
13. The answer is II only, Choice D.
14. The answer is 22, Choice D.
15. The answer is 12, Choice D.
16. The answer is $\frac{9}{21} = \frac{3}{7}$, grid-in.
17. The answer is 4, Choice C.
18. The answer is 499, Choice B.
19. The answer is $2 \cdot 3^{24}$, Choice C.
20. The answer is 2^{26} , Choice C.
21. The answer is December, Choice E.
22. The answer is 6, grid-in.
23. The answer is Tuesday, Choice B.
24. The answer is 67, grid-in.
25. The answer is 36, grid-in.