

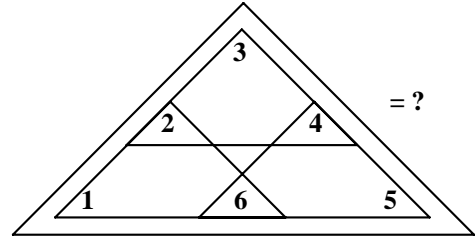
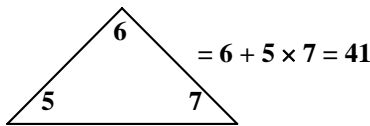
Problem Sheet – 2001

4th – 5th Grades

1. Which day of the week is repeated less number of times than others from March 18, 2001 to December 31, 2049?

A: Sunday B: Tuesday C: Thursday D: Saturday N: None of these

2. Using the triangular pattern below, compute the value represented by the right triangle.



A: 238 B: 283 C: 328 D: 382
N: None of these

3. Decode the following sentence and find the first (missing) number:

? + 12 + 6 + 9 23 + 22 + 24 + 12 + 23 + 18 + 13 + 20 18 + 8 24 + 12 + 9 + 9 + 22 + 24 + 7.

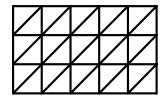
A: 2 B: 12 C: 22 D: 32 N: None of these

4. How many three-digit numbers have the property that their right digit is less than their middle digit that is less than their left digit? (Note: A three-digit number cannot have 0 as its left digit.)

A: 100 B: 120 C: 150 D: 240 N: None of these

5. How many triangles are in this figure?

A: 30 B: 41 C: 46 D: 52 N: None of these



6. There are number of tables and chairs in a classroom. If you try to put the same number of chairs around each table you have three chairs left. But if you just try to put one more chair for each table you have four chairs missing. How many tables are there in a classroom?

A: 3 B: 4 C: 7 D: 10 N: None of these

8	8	1
7	?	2
6	216	3
5	625	4

7. Find the missing number in the table.

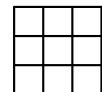
A: 14 B: 27 C: 49 D: 107 N: None of these

8. Compute $2001 + 2000 + 1999 + \dots + 2 + 1 + 0 - 1 - 2 - 3 - \dots - 1993 - 1994 - 1995$.

A: 15 B: 2001 C: 9995 D: 11991 N: None of these

9. Square 3×3 filled in with 9 numbers (from 1 to 9) in any order. For each sub-square 2×2 the sum of all its four numbers is calculated and placed in the center of this sub-square. After calculations all original numbers are erased. Then the sum of remaining four numbers is calculated and placed in the center of picture, and these four numbers are erased. Find the least possible value of the remaining number.

A: 60 B: 62 C: 64 D: 68 N: None of these



10. Square 3×3 made from a Bickford's fuse (a special kind of rope). You can set fire to this fuse net in exactly one place. If you do so at the corner, net will be burnt down in 24 minutes. Find the least number of minutes you need to burn this net down.

Problem Sheet – 2001

A: 10

B: 12

C: 15

D: 16

N: None of these

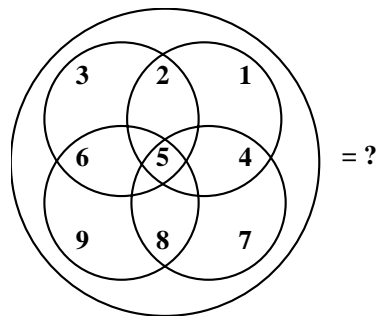
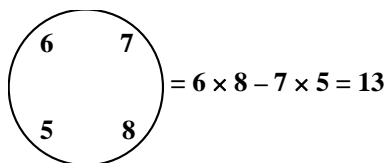
Problem Sheet – 2001

6th – 7th Grades

1. How many different factors does 2001 have? (Note: Count only positive integer factors.)

- A: 3 B: 4 C: 7 D: 8 N: None of these

2. Using the circular pattern below, compute the value represented by the right circle.



- A: 3 B: 9 C: 18 D: 81 N: None of these

3. Decode the following sentence and find the missing number:

$-2 - 12 - 6 - 9$ $4 + 5 + 3 - 12 + \underline{\quad} + 9 - 13 + 7$ $9 - 8$ $3 - 12 - 9 - 9 + 5 + 3 - 7$.

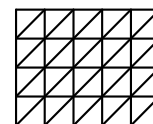
- A: 4 B: 6 C: 8 D: 10 N: None of these

4. How many three-digit numbers have the property that their right digit is less than their middle digit that is less than their left digit? (Note: A three-digit number cannot have 0 as its left digit.)

- A: 100 B: 120 C: 150 D: 240 N: None of these

5. How many triangles are in this figure?

- A: 40 B: 48 C: 60 D: 80 N: None of these



6. There are number of tables and chairs in a classroom. If you try to put the same number of chairs around each table you have three chairs left. But if you just try to put one more chair for each table you have four chairs missing. How many tables are there in a classroom?

- A: 3 B: 4 C: 7 D: 10 N: None of these

7. Find the missing number in the sequence: 1, 8, 81, ?, 15625.

- A: 999 B: 1000 C: 1001 D: 1024 N: None of these

8. Compute $2001 + 1999 + 1997 + \dots + 5 + 3 + 1 - 0 - 2 - 4 - \dots - 1992 - 1994 - 1996$.

- A: 4000 B: 4998 C: 4999 D: 5000 N: None of these

9. Square 3×3 filled in with 9 numbers (from 1 to 9) in any order. For each sub-square 2×2 the sum of all its four numbers is calculated and placed in the center of this sub-square. After calculations all original numbers are erased. Then the sum of remaining four numbers is calculated and placed in the center of picture, and these four numbers are erased. Find the greatest possible value of the remaining number.

- A: 92 B: 96 C: 98 D: 100 N: None of these



10. Square 3×3 made from a Bickford's fuse (a special kind of rope). You can set fire to this fuse net in exactly two places at the same time. If you do so at the opposite corners, net will be burnt down in 12 minutes. Find the least number of minutes you need to burn this net down.

Problem Sheet – 2001

A: 8

B: 9

C: 10

D: 11

N: None of these

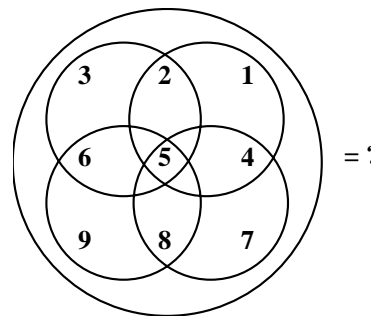
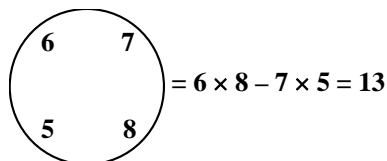
Problem Sheet – 2001

8th Grade

1. How many different factors does 20018004 have? (Note: Count only positive integer factors.)

- A:** 6 **B:** 8 **C:** 48 **D:** 96 **N:** None of these

2. Using the circular pattern below, compute the value represented by the right circle.



- A:** 3 **B:** 9 **C:** 18 **D:** 81 **N:** None of these

3. In how many different ways can you cut a given triangle onto three triangles that have exactly the same area?

- A:** 10 **B:** 16 **C:** 19 **D:** 22 **N:** None of these

4. How many three-digit numbers have the property that their right digit is less than or equal to their middle digit that is less than or equal to their left digit? (Note: A three-digit number cannot have 0 as its left digit.)

- A:** 99 **B:** 119 **C:** 199 **D:** 219 **N:** None of these

5. How many triangles are in this figure?

- A:** 100 **B:** 120 **C:** 124 **D:** 144 **N:** None of these



6. In how many different ways can you replace letters with digits to obtain correct addition example? (Note: Each letter represents a digit, different letters represent different digits, the same letters represent the same digits. SHE and THEY represent three-digit and four-digit numbers, so they cannot have 0 as their left digit.)

$$\begin{array}{r} \text{S H E} \\ + \text{S H E} \\ \hline \text{T H E Y} \end{array}$$

- A:** 1 **B:** 2 **C:** 3 **D:** 4 **N:** None of these

7. 20% of American families that have cat(s) also have dog(s). 25% of American families that have dog(s) also have cat(s). 20% of American families do not have any dogs or cats. How many percents of American families have both dog(s) and cat(s)?

- A:** 10 **B:** 15 **C:** 20 **D:** 25 **N:** None of these

8. Which of the following numbers is not a factor of $1^2 + 2^2 + 3^2 + \dots + 1999^2 + 2000^2 + 2001^2$?

- A:** 299 **B:** 2001 **C:** 2233 **D:** 4003 **N:** None of these

9. Square 3x3 filled in with 9 numbers (from 1 to 9) in any order. For each sub-square 2x2 the sum of all its four numbers is calculated and placed in the center of this sub-square. After calculations all original numbers are erased. Then the sum of remaining four numbers is calculated and placed in the center of picture, and these four numbers are erased. Find the greatest possible value of the remaining number.

- A:** 92 **B:** 96 **C:** 98 **D:** 100 **N:** None of these



10. Square 3x3 made from a Bickford's fuse (a special kind of rope). You can set fire to this fuse net in exactly two places at the same time. If you do so at the opposite corners, net will be burnt down in 12 minutes. Find the least number of minutes you need to burn this net down.

- A:** 8 **B:** 9 **C:** 10 **D:** 11 **N:** None of these

Problem Sheet – 2001

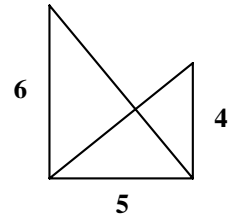
9th – 10th Grades

1. How many different factors does 20018004 have? (Note: Count only positive integer factors.)

A: 6 **B:** 8 **C:** 48 **D:** 96 **N:** None of these

2. Two right triangles have a common leg of length 5, as shown. Find the area (in corresponding square units) of their common part.

A: 4 **B:** 5 **C:** 6 **D:** 9 **N:** None of these



3. In how many different ways can you cut a given triangle onto three triangles that have exactly the same area?

A: 10 **B:** 16 **C:** 19 **D:** 22 **N:** None of these

4. Find how many four-digit numbers have their digits in a strict descending order (from left to right). Examples: 8521, 7530, 9876. (Note: A four-digit number cannot have 0 as its left digit.)

A: 120 **B:** 180 **C:** 200 **D:** 210 **N:** None of these

5. Compute $1^2 - 1 \times 2 + 2^2 - 2 \times 3 + 3^2 - 3 \times 4 + 4^2 - 4 \times 5 + \dots - 2000 \times 2001 + 2001^2$.

A: 1002003 **B:** 1003002 **C:** 2001003 **D:** 3002001 **N:** None of these

6. In how many different ways can you replace letters with digits to obtain correct addition example? (Note: Each letter represents a digit, different letters represent different digits, the same letters represent the same digits. TWO and FOUR represent three-digit and four-digit numbers, so they cannot have 0 as their left digit.)

$$\begin{array}{r} \text{TWO} \\ + \text{TWO} \\ \hline \text{FOUR} \end{array}$$

A: 1 **B:** 3 **C:** 5 **D:** 7 **N:** None of these

7. 20% of American families that have cat(s) also have dog(s). 25% of American families that have dog(s) also have cat(s). 20% of American families do not have any dogs or cats. How many percents of American families have both dog(s) and cat(s)?

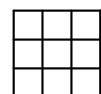
A: 10 **B:** 15 **C:** 20 **D:** 25 **N:** None of these

8. Which of the following numbers is not a factor of $1^2 + 2^2 + 3^2 + \dots + 1999^2 + 2000^2 + 2001^2$?

A: 299 **B:** 2001 **C:** 2233 **D:** 4003 **N:** None of these

9. Square 4×4 filled in with 16 numbers (from 1 to 16) in any order. For each sub-square 2×2 the sum of all its four numbers is calculated and placed in the center of this sub-square. After calculations all original numbers are erased. The picture we obtain looks like square 3×3 filled in with 9 numbers. Again, for each sub-square 2×2 the sum of all its four numbers is calculated and placed in the center of this sub-square. After calculations all 9 numbers are erased. Then the sum of remaining four numbers is calculated and placed in the center of picture, and these four numbers are erased. Find the least possible value of the remaining number.

A: 348 **B:** 350 **C:** 352 **D:** 360 **N:** None of these



10. Square 3×3 made from a Bickford's fuse (a special kind of rope). You can set fire to this fuse net in exactly three places at the same time. If you do so at the corners, net will be burnt down in 12 minutes. Find the least number of minutes you need to burn this net down.

A: 6 **B:** 7 **C:** 8 **D:** 10 **N:** None of these

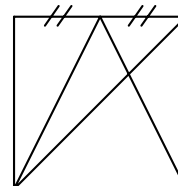
Problem Sheet – 2001

11th – 12th Grades

1. Find how many times per twenty-four hours the hour-hand and the minute-hand of a clock form a right angle. (Note: The clock always shows correct time.)

A: 12 **B:** 22 **C:** 24 **D:** 48 **N:** None of these

2. Five triangles compose a square, as shown. Let us name these parts as left, right, top, bottom and center triangles. Compute how many times the total area of the left and right triangles is greater than the total area of the top and bottom triangles.



A: 3/4 **B:** 5/6 **C:** 1 **D:** 6/5 **N:** None of these

3. In how many different ways can you cut a given triangle onto three triangles that have exactly the same area?

A: 10 **B:** 16 **C:** 19 **D:** 22 **N:** None of these

4. Find how many four-digit numbers have their digits in a descending order (from left to right). Examples: 8522, 7530, 9991. (Note: A four-digit number cannot have 0 as its left digit.)

A: 479 **B:** 574 **C:** 624 **D:** 714 **N:** None of these

5. Compute $(1^2 - 1 \times 4 + 4^2) + (2^2 - 3 \times 2 \times 3 + 3^2) + (5^2 - 5 \times 8 + 8^2) + (6^2 - 3 \times 6 \times 7 + 7^2) + \dots$
 $\dots + (1997^2 - 1997 \times 2000 + 2000^2) + (1998^2 - 3 \times 1998 \times 1999 + 1999^2)$.

A: 4000 **B:** 4002 **C:** 4020 **D:** 4200 **N:** None of these

6. In how many different ways can you replace letters with digits to obtain correct addition example? (Note: Each letter represents a digit, different letters represent different digits, the same letters represent the same digits. GRADE, CLASS and SCHOOL represent five-digit, five-digit and six-digit numbers, so they cannot have 0 as their left digit.)

$$\begin{array}{r} \text{G R A D E} \\ + \text{C L A S S} \\ \hline \text{S C H O O L} \end{array}$$

A: 0 **B:** 1 **C:** 2 **D:** 3 **N:** None of these

7. 20% of American families that have cat(s) also have dog(s). 25% of American families that have dog(s) also have cat(s). 20% of American families do not have any dogs or cats. How many percents of American families have both dog(s) and cat(s)?

A: 10 **B:** 15 **C:** 20 **D:** 25 **N:** None of these

8. Which of the following numbers is not a factor of $1^2 + 2^2 + 3^2 + \dots + 1999^2 + 2000^2 + 2001^2$?

A: 299 **B:** 2001 **C:** 2233 **D:** 4003 **N:** None of these

9. Square 4×4 filled in with 16 numbers (from 1 to 16) in any order. For each sub-square 2×2 the sum of all its four numbers is calculated and placed in the center of this sub-square. After calculations all original numbers are erased. The picture we obtain looks like square 3×3 filled in with 9 numbers. Again, for each sub-square 2×2 the sum of all its four numbers is calculated and placed in the center of this sub-square. After calculations all 9 numbers are erased. Then the sum of remaining four numbers is calculated and placed in the center of picture, and these four numbers are erased. Find the greatest possible value of the remaining number.



A: 724 **B:** 730 **C:** 736 **D:** 740 **N:** None of these

10. Square 3×3 made from a Bickford's fuse (a special kind of rope). You can set fire to this fuse net in exactly four places at the same time. If you do so at the corners, net will be burnt down in 10 minutes. Find the least number of minutes you need to burn this net down.

A: 6 **B:** 7 **C:** 8 **D:** 9 **N:** None of these

Answer Sheet – 2001

4th – 5th Grades

1. A B C D N
2. A B C D N
3. A B C D N
4. A B C D N
5. A B C D N
6. A B C D N
7. A B C D N
8. A B C D N
9. A B C D N
10. A B C D E

Total Score: 50

Answer Sheet – 2001

6th – 7th Grades

1. A B C D N
2. A B C D E
3. A B C D N
4. A B C D N
5. A B C D N
6. A B C D N
7. A B C D N
8. A B C D N
9. A B C D N
10. A B C D N

Total Score: 50

Answer Sheet – 2001

8th Grade

1. A B C D N
2. A B C D E
3. A B C D N
4. A B C D N
5. A B C D N
6. A B C D N
7. A B C D N
8. A B C D N
9. A B C D N
10. A B C D N

Total Score: 50

Answer Sheet – 2001

9th – 10th Grades

1. A B C N
2. A B D N
3. A C D N
4. A B C N
5. A B C D N
6. A B C N
7. B C D N
8. A C D N
9. A B D N
10. A B D N

Total Score: 50

Answer Sheet – 2001

11th – 12th Grades

1. A B C D E
2. A B C D E
3. A B C D E
4. A B C D E
5. A B C D E
6. A B C D E
7. A B C D E
8. A B C D E
9. A B C D E
10. A B C D E

Total Score: 50

Answer Sheet

1. A B C D N
2. A B C D N
3. A B C D N
4. A B C D N
5. A B C D N
6. A B C D N
7. A B C D N
8. A B C D N
9. A B C D N
10. A B C D N

Total Score: