

1. [Number Theory, 3 Points]

Three wooden beams with 15 foot, 18 feet, and 24 feet long will be cut into equal lengths without any residual.

How much is the fewest price if each cutting cost \$2?

- A) \$30 B) \$32 C) \$34 D) \$36 E) \$38

2. [Algebra, 3 Points]

For positive decimal numbers a and b , and integers A and B ,

$$A = a + \frac{3}{4}$$

$$B = b + \frac{2}{5}$$

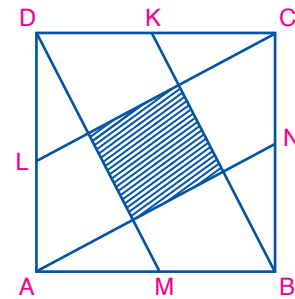
Which of the following is the fractional part of $a + b$?

- A) 78 B) 82 C) 85 D) 87 E) 95

3. [Geometry, 3 Points]

In the given figure, points K , L , M , and N are the midpoints of the sides of the square $ABCD$.

What is the area of the shaded region, if $\text{Area}(ABCD) = 4 \text{ cm}^2$?



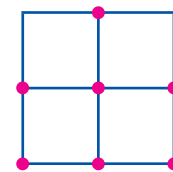
- A) $\frac{1}{2} \text{ cm}^2$ B) $\frac{1}{4} \text{ cm}^2$ C) $\frac{4}{5} \text{ cm}^2$ D) $\frac{2}{5} \text{ cm}^2$ E) $\frac{1}{5} \text{ cm}^2$

4. [Combinatorics, 3 Points]

Seven points are located at the corners identical squares as shown.

Three points are chosen at random and then connected.

What is the probability that these connected points form a triangle?



- A) $\frac{32}{35}$ B) $\frac{27}{35}$ C) $\frac{24}{35}$ D) $\frac{5}{7}$ E) $\frac{3}{7}$

5. [Number Theory, 5 Points]

For non-negative integer n ,

$$N = 18 \cdot 12^n$$

What is n if the number of positive factors of N is 96?

- A) 4 B) 5 C) 6 D) 7 E) 8

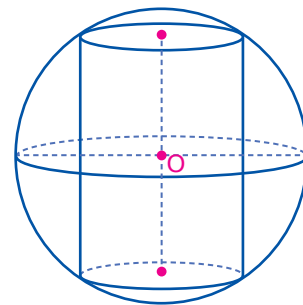
6. [Combinatorics, 5 Points]

How many positive numbers less than 3000 and divisible by 5 can be formed using the digits 0, 1, 2, 3, 4, 5, 6 if no digits are repeated?

- A) 162 B) 157 C) 155 D) 152 E) 147

7. [Geometry, 5 Points]

In the given figure, a right cylinder is inscribed in a sphere of radius 3 cm. O is the center of both sphere and cylinder, and the radius of the cylinder is 1 cm.

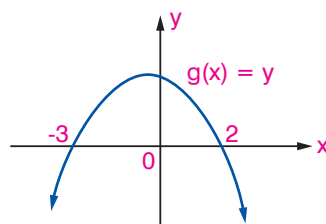
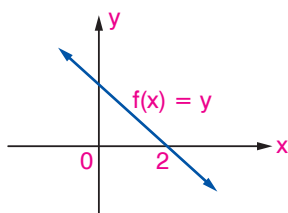


What is the volume of the cylinder?

- A) $\frac{3\pi}{2} \text{ cm}^3$ B) $3\pi \text{ cm}^3$ C) $3\sqrt{3}\pi \text{ cm}^3$ D) $4\sqrt{2}\pi \text{ cm}^3$ E) $9\pi \text{ cm}^3$

8. [Algebra, 5 Points]

The graphs of the functions $f(x) = y$ and $g(x) = y$ are given below.



What is the sum of **greatest** two distinct integer values of x if $\frac{f(x)}{g(x)} < 0$?

- A) -9 B) -8 C) -6 D) -5 E) -4

9. [Combinatorics, 7 Points]

For the non-negative integers, a , b , c , and d ,

$$4 < a + b + c + d < 10$$

What is the number of solutions of the inequality above?

A) 220

B) 375

C) 455

D) 565

E) 645

10. [Geometry, 7 Points]

The points K , L , M , and N lie on the ellipse $\frac{x^2}{9} + \frac{y^2}{16} = 1$.

What is the area of $KLMN$, if $KLMN$ is a square?

A) 23.04 cm²B) 21.16 cm²C) 19.36 cm²D) 18.49 cm²E) 17.64 cm²