What is the ratio of the area of $\triangle AKJ$ to the area of $\triangle ABC$?

**Given**

$\triangle ABC \cong \triangle CDE \cong \triangle EFG \cong \triangle GHJ$

$\triangle ABC$ is similar to $\triangle AKJ$
Question 1- Answer

16 : 1 or 16 to 1

Question 2  60 seconds left  30 seconds left  10 seconds left

The figure represents a structure composed of 1in x 1in x 1in cubes forming stacks of height 3, 4, 2, and 1, as shown. What is the total exposed surface area, not including the bottom of the structure?

Answer must be in proper units.

TIME’S UP!!!
Question 2- Answer

32 sq. in.

Question 3  60 seconds left

A *triangular* number “counts” the number of dots that can be arranged in an equilateral triangle. For example, 6 is a *triangular* number since six dots can be arranged in an equilateral triangle like this:

A *perfect* number is a number that is the sum of its proper divisors. 6 is also *perfect*, because its proper divisors are 1, 2 and 3, and $1+2+3 = 6$.

Find the next *perfect* number larger than 6, and show it is *triangular*. (Hint: it's even!)

Your answer must include the number and a graph.

TIME’S UP!!!
Some cookies had been eaten without Ms. Kattie’s permission, by one or more of her five children. When questioned, they gave the following answers:

- Allie: One of us ate the cookies.
- Bessie: Two of us ate the cookies.
- Chucky: Three of us ate the cookies.
- Davy: Four of us ate the cookies.
- Elmo: Five of us ate the cookies.

If the guilty ones lied, while the others told the truth, how many children ate the cookies?

TIME’S UP!!!
4 children
Davy told the truth!!!

A positive integer \( n \), when written in base \( b > 0 \), has the form 211.

When \( n \) is written in base \( b + 2 \), it has the form 110.

Determine \( n \) and \( b \) (in base 10).

TIME’S UP!!!
Question 5- Answer

\[ n = 56, b = 5 \]

In isosceles triangle \( AOB \) with \( AO=AB \), the measure of vertex angle \( A \) is 108º. Point \( O \) is the center of a circle whose radius is 20. Give the value of the shaded area (without units), leaving \( \pi \) in your answer.

\( \text{TIME’S UP!!!} \)
Question 6 - Answer

\[ 40\pi \]

Question 7

60 seconds left

A new operation for combining two numbers \( a \) and \( b \) is defined by:

\[ a*b := \frac{a + b}{2}. \]

If \( x*(x*4)^2 = \frac{x}{2} \),

what is the value of \( x \)?

TIME’S UP!!!
Question 7 - Answer

- 4

Question 8  60 seconds left  30 seconds left  10 seconds left

Of the digits 1 through 9, one is selected at random.

What is the probability that the selected digit is used in the decimal form of $\frac{5}{7}$?

TIME’S UP!!!
Question 8- Answer

\[
\frac{2}{3}
\]

Question 9  
Find the values for \(i\) and \(j\) after this code has executed:

\[
i \leftarrow 0; j \leftarrow 0; k \leftarrow 2;
\]

\text{repeat while } k < 7

\[
i \leftarrow i + 1;
\]

\[
j \leftarrow j! + i;
\]

\[
k \leftarrow 2k - 1;
\]

\text{endrepeat}

\text{TIME’S UP!!!}
Question 9- Answer

\[ i = 3, \quad j = 27 \]

**Question 10**  
60 seconds left  
30 seconds left

Fill in the blank boxes using each integer 4, 5, 6, 7, 8, 9 once and in such a way that the sums of the columns, rows, and diagonal are equal to the numbers indicated by the arrows.

```
  1
 2
 3
```

\[ \rightarrow 12 \]
\[ \rightarrow 13 \]
\[ \rightarrow 20 \]

15 16 17 12

TIME’S UP!!!
Question 10- Two Possible Answers

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