Bubble in the single best choice for each question you choose to answer.

1. Boris is driving on a remote highway. He notices the odometer reading, 24942 km, is a palindromic number, meaning it is not changed when reversed. "Hmm," he thinks, "it should be a long time before I see that again." But it only takes one hour for the odometer to once again show a palindromic number! How fast is Boris driving?

   (A) 90 km/h
   (B) 100 km/h
   (C) 110 km/h
   (D) 120 km/h
   (E) 140 km/h

2. The minute hand of a courthouse clock measures 12 ft from center. How far, in feet, does the tip of the hand travel in 25 minutes?

   (A) 5π
   (B) 7π
   (C) 8π
   (D) 10π
   (E) 12π

3. Dale lives 0.6 mi from school and it takes him 10 min to walk to school. Marc can walk to school in 5 min and he lives 0.3 mi from school. Jeremy lives 1.5 mi from school, and it takes him 25 min to walk to school while it takes Brittany 30 min to walk 1.8 mi to school. All of the following conclusions can be drawn from the given data EXCEPT:

   (A) They all walk at the same speed.
   (B) They all live < 2 mi from school.
   (C) Dale lives closer to school than Brittany, but farther than Marc.
   (D) Brittany and Jeremy walk slower than Dale and Marc.
   (E) It takes Brittany 3 times as long as Dale to walk to school.

4. If $\frac{1}{2}$, $\frac{1}{4}$, $\frac{1}{8}$, $\frac{1}{16}$, ... is continued, what is the denominator of the 10th term?

   (A) 64
   (B) 212
   (C) 256
   (D) 512
   (E) 1024

5. What is the measure of angle A?

   (A) 30°
   (B) 45°
   (C) 60°
   (D) 75°
   (E) 90°
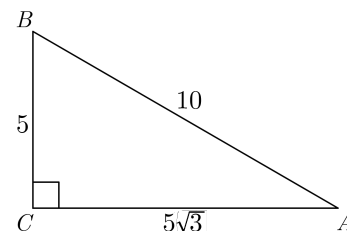
6. A base 26 number system is used with the letters of the alphabet as the digits: $A = 0$, $B = 1$, $C = 2$, ...$Y = 24$, $Z = 25$. In this system, what is $\text{ONE} + \text{ONE}$?

   (A) DBIA

   (B) BAID

   (C) BDAI

   (D) DAIB

   (E) BDIA

7. What is the smallest positive integer n such that $1 + 2 + 3 + \ldots + n > 5000$?

   (A) 90

   (B) 99

   (C) 100

   (D) 101

   (E) 110

8. The city council has changed the numbering scheme for the 200 houses on Elm Street. They will be renumbered with the natural numbers from 1 through 200. A city worker is given a box of 1000 metal numbers, 100 of each digit, and told to distribute new house numbers in order starting with 1 Elm Street. What is the first address for which he will not have the correct digits?

   (A) 137 Elm Street

   (B) 163 Elm Street

   (C) 172 Elm Street

   (D) 191 Elm Street

   (E) 199 Elm Street

9. One can of frozen juice concentrate, when mixed with $4\frac{1}{3}$ cans of water, makes 2 quarts ($64\,\text{oz}$) of juice. Assuming no volume is gained or lost by mixing, how many oz does a can hold?

   (A) 8

   (B) 10

   (C) 12

   (D) 15

   (E) 18

10. Suzie wants to draw eight 1-inch wide stripes on a 24-inch-wide poster. Both sides of the poster will have a stripe right on the edge. She wants the gaps between the eight stripes to be the same everywhere. What is the width of each gap between the stripes?

    (A) $3\,\text{in}$

    (B) $\frac{16}{7}\,\text{in}$

    (C) $2\,\text{in}$

    (D) $\frac{7}{4}\,\text{in}$

    (E) $\frac{8}{7}\,\text{in}$

11. Two straight lines have the same y-intercept and reciprocal slopes. If the first line has slope m and x-intercept a, what is the x-intercept of the other line?

    (A) $\frac{m^2}{a}$

    (B) $\frac{m}{a}$

    (C) $\frac{1}{a}$

    (D) am

    (E) am^2

12. In geometry, a *kissing number* is the number of non-overlapping unit spheres that can be arranged such that they each touch a given unit sphere. In 1-D, the kissing number is 2. In 3-D the kissing number is 12. What is the kissing number in 2-D?

(A) 4

(B) 5

(C) 6

(D) 7

(E) 8
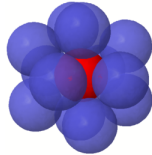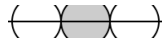
13. Simplify $\sqrt{\sqrt[0.06]{2^{0.12}}}$

(A) 1

(B) $\sqrt{2}$

(C) 2

(D) $2^{0.0384}$

(E) 4

14. In a drawer are 6 black, 2 gray, and 2 tan socks. What is the probability of blindly pulling out (without replacement) four black socks in a row?

(A) $\frac{1}{14}$

(B) $\frac{1}{7}$

(C) $\frac{1}{4}$

(D) $\frac{2}{5}$

(E) $\frac{3}{5}$

15. Given sets $A = \{evens\}$, $B = \{non\text{-}primes\}$, and $C = \{primes < 19\}$, and universal set $U = \{0, 1, 2, 3, 10, 11, 12, 13, 20, 21, 22, 23\}$, find the complement of $A \cup B \cup C$.

(A) $\{0, 23\}$

(B) $\{0, 10, 20\}$

(C) $\{23\}$

(D) $\{1, 3, 11, 13, 21, 23\}$

(E) $\emptyset$

16. In a music class, 15 students play violin, 14 play piano, and 16 play horns. Of these, 6 play piano and violin, 9 play piano and horns, and 5 play horns and violin. Four students play all three and 2 students play none. How many students are in the class?

(A) 21

(B) 23

(C) 31

(D) 45

(E) 47

17. Square $PQRS$ has sides of length 10. Points T, U, V, and W are chosen on sides PQ, QR, RS, and SP respectively so that $PT = QU = RV = SW = 2$. Find the area of quadrilateral $TUVW$.

(A) 48

(B) 52

(C) 56

(D) 64

(E) 68

18. Pi High School sent a team of 5 students to the Snow College Math Contest in 2015. In 2016 PHS sent the same team except the oldest member (graduated) was replaced with a younger student. If the average team member age was the same for both years, how many years younger was the new member than the old member who was replaced?

(A) 1

(B) 2

(C) 3

(D) 4

(E) 5

19. What is the ratio of the area of a circle to the area of the figure created by flipping each quarter circle around its chord?

(A) $\frac{3\pi}{4}$

(B) $\pi + 1$

(C) π

(D) $\pi - 1$

(E) $\frac{\pi}{4-\pi}$
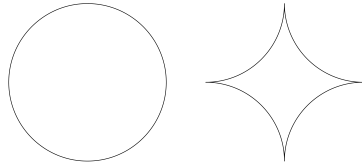
20. Definition of the *triangle of power* notation:

$$\underset{x}{\overset{y}{\triangle}}_{z} \Leftrightarrow x^y = z \Leftrightarrow \sqrt[y]{z} = x \Leftrightarrow \log_x z = y$$

Any of x, y, z is equivalent to the triangle of power with that number missing, e.g.,

$$\overset{y}{\triangle}_{z} = x$$

Find the value of the following. $\quad \underset{2}{\triangle}_{8}$

(A) 2

(B) $\sqrt{8}$

(C) 3

(D) 4

(E) 16