Grade 7/8 Math Circles
## February 26-29, 2024
Gauss Contest Prep

Grade 7

1. Q21 2000: In a basketball shooting competition, each competitor shoots ten balls which are numbered from 1 to 10. The number of points earned for each successful shot is equal to the number on the ball. If a competitor misses exactly two shots, which one of the following scores is not possible?

   (A) 52   (B) 44   (C) 41   (D) 38   (E) 35

2. Q22 2021: In the diagram shown, each figure after Figure 1 is formed by joining two rectangles to the bottom of the previous figure. Each individual rectangle has dimensions 10 cm by 5 cm. If Figure n has a perimeter of 710 cm, the value of n is

   (A) 30   (B) 45   (C) 60   (D) 90   (E) 55
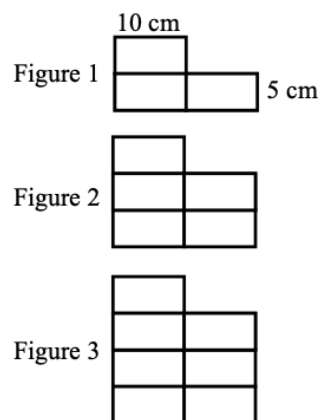
3. Q25 2006: Five students wrote a quiz with a maximum score of 50. The scores of four of the students were 42, 43, 46, and 49. The score of the fifth student was N. The average (mean) of the five students' scores was the same as the median of the five students' scores. The number of values of N which are possible is

   (A) 3   (B) 4   (C) 1   (D) 0   (E) 2

4. Q23 2013: In the right-angled triangle PQR, $PQ = QR$. The segments QS, TU and VW are perpendicular to PR, and the segments ST and UV are perpendicular to QR, as shown. What fraction of $\triangle PQR$ is shaded?
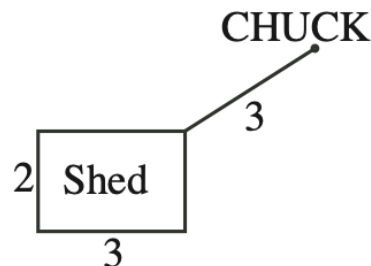
   (A) $\frac{3}{16}$ (B) $\frac{3}{8}$ (C) $\frac{5}{16}$ (D) $\frac{5}{32}$ (E) $\frac{7}{32}$
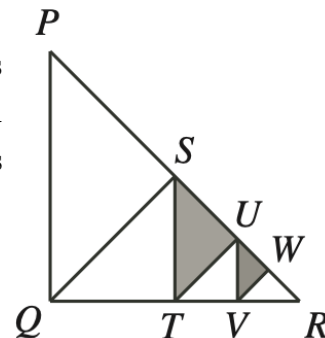
Grade 8

1. Q22 2007: Chuck the llama is tied to the corner of a 2m by 3m shed on a 3m leash. How much area does Chuck have in which to play if he can go only around the outside of the shed?

   (A) 7π m^2 (B) 9π m^2 (C) $\frac{27}{4}\pi$ m^2 (D) 4π m^2 (E) 5π m^2

2. Q22 2005: Fifty students were surveyed about their participation in hockey and baseball. The results of the survey were:

   - 33 students played hockey
   - 24 students played baseball
   - 8 students played neither hockey nor baseball

   How many of the students surveyed played both hockey and baseball?

   (A) 1 (B) 7 (C) 9 (D) 15 (E) 16

3. Q21 1998: The number 315 can be written as the product of two odd integers each greater than 1. In how many ways can this be done?

   (A) 0 (B) 1 (C) 3 (D) 4 (E) 5

4. Q24 2009: Starting at point P, Breenah constructs a straight sided spiral so that:
   - all angles are 90°
   - after starting with a line segment of length 1, each side is 1 longer than the previous side

   After completing the side with length 21, Breenah's distance from her original starting point P will be between
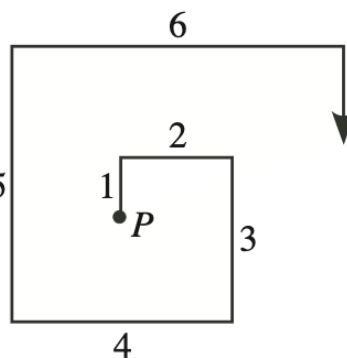
   (A) 13 and 14 (B) 14 and 15 (C) 15 and 16 (D) 16 and 17 (E) 17 and 18

For solutions to each problem, see this link and select the matching year & grade.