Competition C – Freshman-Sophomore 8 Person Team

Team Make-up: maximum 8 students, freshmen and sophomores only, no more than 4 may be sophomores
Questions: 20
Time: 20 minutes
Format: Team members work together and submit one answer sheet
NO Calculators permitted
Answers must be legible
Answers must be **exact** unless otherwise indicated in the question
Scoring: Correct answers are worth 5 points each; Maximum 100 points possible per team

Sample Regional Questions

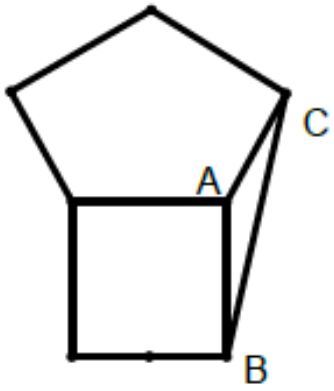
1. Two integers have a sum of 30 and a difference of 14. Find the larger of the two integers.

   Answer: 22

2. Given that $xy \neq 0$ and $\dfrac{8x^4\left(2x^2y^3\right)^3}{\left(4x^3y^5\right)^2\left(xy^3\right)} = ax^by^c$, find the sum $(a+b+c)$.

   Answer: 3

3. On a plane, a regular pentagon and a square share a common side as shown. Determine the degree measure of $\angle ABC$.



   Answer: 9

4. A jar contains 20 red, 15 white, and 15 blue marbles. Three marbles are drawn without replacement. Determine the probability that one of each color marble was drawn. Express your answer as a common fraction reduced to lowest terms.

   Answer: $\dfrac{45}{196}$

5. Parallelogram $ABCD$ has $AB=8$, $AD=12$, and $\angle B=120°$. Determine the area of this parallelogram.

Answer: $48\sqrt{3}$

6. Determine the value of k such that $k+\sqrt{17}=\dfrac{1}{8+\dfrac{1}{8+\cdots}}$.

Answer: –4

7. Let $a>b$, $a+b=5$, and $ab=3$. Determine the value of $(a-b)$.

Answer: $\sqrt{13}$

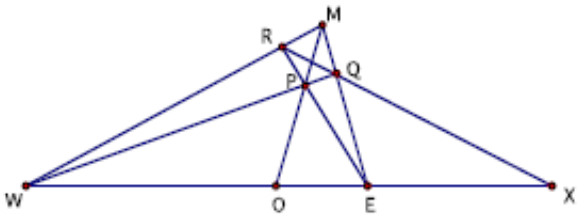
8. For a lab experiment, a chemistry teacher needs 50 gallons of a 3% salt solution. He has 5% and 2% solutions he can mix to make the 50 gallons of the desired solution. Determine the number of gallons of 2% solution he must use. Express your answer as an integer or as a common or improper fraction reduced to lowest terms.

Answer: $\dfrac{100}{3}$

9. A cook at a summer camp knows how to prepare two different dishes for dinner. He prepares one of those dishes for dinner each day. The camp only allows him to cook any one dish no more than two days in a row. Determine the number of different 10-day dinner menus he could prepare.

Answer: 178

10. In the figure, O is between W and E, with $OW=50$ and $OE=10$. P, M, and O are collinear. $\overline{EP}\cap\overline{WM}=R$, $\overline{EM}\cap\overline{WP}=Q$, and $\overline{RQ}\cap\overline{WE}=X$ Determine the length of $\overline{OX}$.



Answer: 25