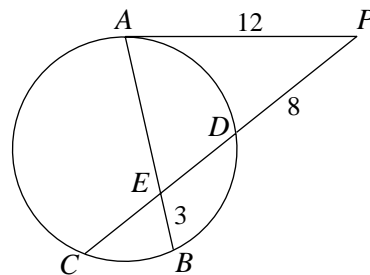


Section A. Each correct answer is worth 1 point.

1. Find the sum of the first six prime numbers.
2. Give the official (and more common) name for a regular quadrilateral.
3. Express the repeating decimal $0.1\bar{7}$ as a ratio of two positive integers in simplest form.
4. If $2x + 1 = 2003$, find the value of $3x - 1000$.
5. A non-isosceles triangle has integral sides of 4, 5, and x . Find all possible values of x .
6. Using some or all of the digits 0–9 (no digit more than once), construct the largest possible six-digit odd number with a 9 in the tens place.
7. $7 + (-7) = 0$. This is an example of what basic property of addition?

Section B. Each correct answer is worth 2 points.

8. If $(x^5 + x^4 + x - 5)$ is divided by $(x + 1)$, find the remainder.
9. Find the 2003rd digit after the decimal point in the decimal representation of $4/7$.
10. In the figure on the right, the length of tangent \overline{AP} is 12, $PD = 8$, and chord \overline{AB} bisects chord \overline{CD} . If $EB = 3$, find the length of \overline{AE} .



11. Express in simplest radical form (no radicals in the denominator): $\frac{3 + \sqrt{2}}{4 - 2\sqrt{2}}$
12. Write the exact numerical value of x if $\log_8 128 = x$. Express in simplest form.

Section C. Each correct answer is worth 3 points.

13. The ellipse $x^2 + 2y^2 + 12y - 10x - 57 = 0$ has a major axis with two endpoints. Find the coordinates of the endpoint that lies in quadrant IV. Express in ordered pair form, (x, y) .
14. Softball player Berni Williams has 120 hits in 300 at-bats for a current batting average of .400. In today's game, she will have 5 at-bats. What is the probability that she will get *exactly* 2 hits?
15. Solve the inequality $\left| \frac{x + 2}{3} \right| > 1$ and graph its solution on the given number line.

Section A. Each correct answer is worth 1 point.

1. Find the exact value of the average of the squares of the first six natural numbers.
 2. On the first test you scored 80. On the second test you scored 89. Find the percent of increase to the nearest hundredth of one percent.
 3. Let $a = \log_2 8$; let $b = \log_3 8$. Find the value of $a - b$ correct to the nearest hundredth.
 4. Let $\sin \theta = -\frac{5}{7}$, with terminal side in quadrant IV. Write the exact value of $\tan \theta$.
 5. Name the author of the first geometry book, *Elements*.
 6. Otto's Auto Rental charges \$52 per day, and 32 cents per mile for an automobile rental. Arnold paid \$578.40 to rent a car for three days. How many miles did he drive?
 7. Find the domain of the function: $f(x) = x^2 - 2$.
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Section B. Each problem is worth 2 points.

8. Write the equation of the line through $(-3, 2)$ and perpendicular to the line $3x - y = 7$. Express your answer in slope-intercept form: $y = mx + b$.
 9. The positive integers a, b, c are said to form a Pythagorean triple if $a^2 + b^2 = c^2$. Write two distinct Pythagorean triples in the form a, b, c (with $a < b < c$) such that $c = 65$.
 10. $n! = \sum_{k=1}^{15} k$. Write the value of n .
 11. Find three numbers a, b , and c so that $2, a, b, c, 5$ is an arithmetic sequence.
 12. In a certain class of 60 students:
20 study German; 25 study Spanish; 18 study French;
5 study German and French; 9 study German and Spanish;
7 study Spanish and French; 4 study all three languages.
How many students are studying no language?
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Section C. Each problem is worth 3 points.

13. From the top of a 200-ft-tall square water tower, SpongeBob observes a car moving toward the tower. If the angle of depression of the car changes from 25° to 50° during the time of observation, how far does the car travel (to the nearest foot)?
14. Given matrices $\mathbf{A} = \begin{bmatrix} 3 & 3 & -1 \\ 2 & x & 5 \end{bmatrix}$ and $\mathbf{B} = \begin{bmatrix} 9 & 2 \\ 4 & 3 \\ -7 & 1 \end{bmatrix}$. The value of the entry in the second row, first column of matrix \mathbf{AB} is 2003. Find x .
15. A right circular cone has the same volume as a sphere. If the base of the cone has the same radius as the sphere, find the height of the cone in terms of that radius r .