

Section A. Each correct answer is worth 1 point.

1. How many positive integral factors does 10 have?
2. Give the more common name for a regular quadrilateral.
3. Find the arithmetic mean (average) of the first seven positive integers.
4. Which one is not equal to the other four? Answer with a **capital letter**.
 A) $(20)(2.4)$ B) 60% of 80 C) $(2(4 + 8))3$
 D) $36/(3/4)$ E) $2\left(\sqrt{25 + 75} + \sqrt{\sqrt{81}}\right) + (12 \cdot 2 - 2)$
5. Solve for x : $4x + 1 = 3(x + 1)$.
6. Simplify: $10^3 + 30^2 + 10^2 + 2^3$.
7. The clock on the wall is a standard clock with an hour hand and a minute hand. What is the measure (in degrees) of the smaller angle formed at 7:00?

Section B. Each correct answer is worth 2 points.

8. Write the numerical value of $\log_2 8$.
9. Subtract the sum of $(n^2 + 3n - 1)$ and $(-2n^2 + 1)$ from $(5n^2 - 4n + 3)$.
10. Express as the ratio of two integers in simplest form: $0.4\bar{3} - 0.3\bar{4}$.
11. If $\begin{vmatrix} a & b \\ 3 & 4 \end{vmatrix} = 12$, solve for b in terms of a . (Note: $\begin{vmatrix} r & s \\ t & u \end{vmatrix}$ is the determinant of that matrix.)
12. Given isosceles $\triangle MNO$, if base \overline{MO} is $\frac{1}{2}$ the length of \overline{MN} , and the perimeter of $\triangle MNO$ is 100 cm, find the length of \overline{ON} .

Section C. Each correct answer is worth 3 points.

13. Express as a single fraction in simplest form: $(ab^{-1} + ba^{-1})^{-1}$.
14. If $i = \sqrt{-1}$, express $\frac{i^{2007} + i^{2008}}{i^{2008} + i^{2009}}$ in simplest form.
15. Factor completely over the rational numbers: $m^4 + 2m^2n^2 + 9n^4$.

Section A. Each correct answer is worth 1 point.

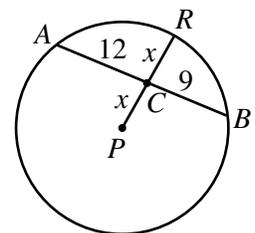
- Line ℓ has a slope of 3 and passes through the point $(0, -1)$. Write the equation of line ℓ in slope-intercept form.
- Which of the following cannot be determined from looking at a boxplot (also called a box-and-whisker plot)?
range minimum mean median 3rd quartile
- Simplify: $(c + d)^2 + c^2 - d^2$.
- If 7 of them cost \$77, how much will 11 of them cost?
- The perimeter of a square is 20 inches. Find the area of the square (include units).
- Solve for m : $|m| = 4 - 1$.
- What is the remainder when 2008 is divided by 7?

Section B. Each problem is worth 2 points.

- Write the numerical value of $\log_2 9$, rounded to 4 places after the decimal.
- Find the area of the triangle whose three vertices are at $(-2, 3)$, $(3, 4)$, and $(2, 0)$.
- In the expansion of the binomial $(x - 2y)^{10}$, find the term that includes x^8 .
- A rhombus is inscribed in an ellipse, and its four vertices are on the x - and y -axes. The equation of the ellipse is $25x^2 + 16y^2 = 400$. Find the area of the rhombus.
- Express 111_{five} as a number in base 4.

Section C. Each problem is worth 3 points.

- Given $\odot P$ as shown, with chord \overline{AB} and radius \overline{PR} , find the length of the diameter of $\odot P$.
- If $\cos(\theta) = 0.8$ and $\tan(\theta) = -0.75$, find the exact value of $\sin(\theta)$.
- A door 2 ft wide and 7 ft high is swung through a 60° arc. Find the volume of the region swept out by the door. Express your answer to the nearest hundredth cubic feet.



PART I

Section A

1. 4
2. square
3. 4
4. C
5. $x = 2$
6. 2008
7. 150°

Section B

8. 3
9. $6n^2 - 7n + 3$
10. $\frac{4}{45}$
11. $b = \frac{4}{3}a - 4$
12. $x = 40$ cm

Section C

13. $\frac{ab}{a^2 + b^2}$
14. $-i$
15. $(m^2 + 3n^2 + 2mn)(m^2 + 3n^2 - 2mn)$

PART II

Section A

1. $y = 3x - 1$
2. mean
3. $2c^2 + 2cd$
4. \$121
5. 25 square inches
6. $m = -3$ or $m = 3$
7. 6

Section B

8. 3.1699
9. 9.5 square units
10. $180x^8y^2$
11. 40 square units
12. 133_{four}

Section C

13. 24 units
14. -0.6
15. 14.66 cubic feet