

TRIANGLES AND POLAR FORMS

1. TRIANGLE PROBLEMS

- (1) How many triangles with integer side lengths have perimeter 12?
- (2) Of the triangles in problem 1, which has the largest area?
- (3) What is the maximum number of intersection points of 8 circles?
- (4) What is the perimeter of a triangle with vertices at $(10, 5)$, $(-6, 3)$, $(7, 4)$?
- (5) What is the circumradius of a 3–4–5 right triangle?
- (6) What is the area of a 4–6–9 triangle?
- (7) What is the inradius of a 5–12–13 right triangle?
- (8) What are the two possible third vertices of a triangle similar to a 3–4–5 right triangle with one vertex at the origin and one vertex at $(1, 0)$?
- (9) What is the third vertex in a 7–8–9 triangle where one vertex is at $(0, 0)$ and another is at $(9, 0)$?
- (10) What is the third vertex in a 13–14–15 triangle where one vertex is at $(0, 0)$ and another is at $(14, 0)$.

2. POLAR FORMS

- (1) Write two different representations of $-4i$ in exponential coordinates.

- (2) Convert $2 - 2i$ to exponential coordinates.

- (3) Convert $\frac{7 + 7\sqrt{3}i}{2}$ to exponential coordinates.

- (4) Convert $e^{\pi \cdot i}$ to rectangular coordinates.

- (5) Convert $6e^{\frac{\pi \cdot i}{2}}$ to rectangular coordinates.

- (6) Convert $3e^{\frac{\pi \cdot i}{6}}$ to rectangular coordinates.

- (7) What is the inverse of $e^{\frac{\pi \cdot i}{2}}$ in exponential form?

- (8) What is the inverse of $4e^{6i}$ in exponential form?

- (9) What is i^{2018} ?

- (10) What is $(\sqrt{2} + \sqrt{2}i)^{2018}$?