TUNITING WAY 28 multinu m # 3 institute the the Institute \$7 \$7 5 multille m # 3 multille m X 3 Multille # # 3 PE **State Mathematics Finals: Geometry** 加加斯林·安陀 April 26, 2012 R titute # # 3 What is the approximate diameter of a wheel that rolled for 314 meters by turning 200 times? 1. e) none of these c) 100 cm d)  $50\pi$  cm a) 25 cm b) 50 cm \* 3 2. What is the area of a rectangle with a side of length 12 cm and a diagonal of length 15 cm? Aritute to the Second b)  $54 \text{ cm}^2$ c)  $135 \text{ cm}^2$ d)  $180 \text{ cm}^2$ e)  $72 \text{ cm}^2$ a)  $108 \text{ cm}^2$ Ro \*\*\* 3. Visualize a quadrilateral with at least one right angle whose vertices lie on a circle. Two nonadjacent vertices are 22 cm apart, and the other two are 30 cm apart. What is the area of the circle? Ro b)  $121\pi \text{ cm}^2$ c)  $169\pi \text{ cm}^2$ d)  $225\pi \text{ cm}^2$ a)  $52\pi \text{ cm}^2$ e)  $330\pi \text{ cm}^2$ Seven sailors, four Russians and three Americans, arrived in a submarine. If they emerged from 4. the vessel in random order, what is the probability that the order was: A, R, R, A, A, R, R? ("A" represents an American sailor, and "R" a Russian one.) b) 1/32 a) 1/21 c) 1/35 d) 1/42 e) 1/128 5. A triangle and a square went into a bar, and it did not take long for them to get into an argument about who was bigger. "I am bigger because I am two inches taller!" Ro about who was bigger. "I am bigger because I am two inches taller!" said the triangle. To which the square replied, "No, I am bigger because my area is two square inches larger!" "No!" interjected the bartender, "You are the same, because you both have the same width." He then threw them out the door. Assuming all told the truth, how wide were the two polygons? · 12. 9% c)  $1 + \sqrt{2}$  in. d)  $2 + \sqrt{2}$  in. e)  $1 + \sqrt{5}$  in No. a) 2 in. b) 2.5 in. What is the height of a right triangle, whose hypotenuse is the base, and whose area and perimeter 6. 影影林楼的机机 前加加教教学家 Astitute the He is the e)  $12\frac{5}{13}$ Y. are both 30? inte m W b)  $4\frac{8}{12}$ a)  $2\frac{4}{13}$ to the W- B. Ph to the W. B. M. R to the the B to the life is to the lit is to the life is





Institute \$ 75 multine m # " Institute \$ 75 multille m # " multitute mar 3 multille m # 3 18. Given a circle with four chords, two of which intersect at *C*. x Ro If BC = 8, CD = 4, DE = 5, and EC = 6, what is x, the length of Asitute # AB? titute the kit inte the the b) 9 a) 10 c) 9.6 d) 6 e) none of these utilite # # 13 1% D Ro 频从资 Astitute the the 加物林 19. A rectangular solid with a black surface area and dimensions 10×8×6 is cut into unit cubes. Assuming the solid's interior is not black, what fraction of these cubes has no black side? a) 13 institute # # '\$ %  $(b)^{2}\frac{5}{12}$ Ro multilite # # a)  $\frac{2}{5}$ timistitute #### Let  $n = k^2 - k + 2$  where k is a natural number. Which of the following statements are true for all 20. Ro values of k? i. n is even ii. n is never divisible by 3 iii *n* is never divisible by 5 b) i and ii c) i and iii d) all of them e) none of them a) i only matinue ## # '\$ PS 柳林戏帆 Ro ·k th 1/2 YN в 21. In  $\triangle ABC AB : BC = 2 : 1$ , points D, E, and F are on  $\overline{AB}$ ,  $\overline{AC}$ , and  $\overline{BC}$ , as shown, and the quadrilateral BDEF is a rhombus. Find the ratio of the areas of quadrilateral BDEF to  $\triangle ABC$ . С e) none of these a) 4:9 Ro b) 2:v with (\* c) 2:3 Asitute to the d) 2:1 The volume of a large spherical balloon is doubled. By what factor is the surface area of the 22. balloon increased?  $\frac{1}{2} \frac{1}{2} \frac{1}$ R within the the the d) <sup>3</sup>√4 c) 2√2 e) none of these 而如此他教林塔梯 而如此此教教 maxitute ## # '& R 而时间很新林塔梯 mythte # # '& K 面的机能称林塔张 Ro to the the B. Ph. to the the the the to the the the to the the the to the W- 1/3 Ph to the We the the Ro

multilite m # " multille m # " multinu m # 3 multinu m x 3 multinu m # 3 multille m # 3 23. The distance from a vertex to the orthocenter of an acute triangle is the same as the distance from N. that vertex to the circumcenter (outer center) of the acute triangle. Determine the measure of the ant all ate the interior angle at this vertex. c) 45° d) 60° b) 30° e) 75° a) 15° ·6 % Ro · 1/2 1/2 16 YN 1/2 Viv 16 YO Consider trapezoids with sides of length 1, 4, 4, and 5. Find the sum of the two diagonals of the 24. trapezoid with the smallest area. d)  $\sqrt{17} + 4\sqrt{2}$ c) 2√21 b) **4√3** e) none of these a) 6 illillim族接接機 Ro Find the area on xy-plane determined by the inequality,  $|2x - 6| + |y - 2| \le 6$ . 25.10 b) 36 c) 42 d) 56 e) 72 a) 12 matitute ## # 18 18 N. ute the the 26.11 标准 A trapezoid ABCD is inscribed in a semi-circle of diameter 8 inches as shown. If  $\overline{CD}$  is parallel to  $\overline{AB}$  and the perimeter of the trapezoid ABCD is 20 inches, what is the area of this trapezoid? b)  $12\sqrt{5} \text{ in}^2$  c)  $16 \text{ in}^2$ Ro Institute # B titute the the a)  $12\sqrt{3}$  in<sup>2</sup> d)  $20 \text{ in}^2$ 27. A line on the xy-plane with a negative slope passes point, (2,1). The line crosses the x-axis at A and the y-axis at B. What is the maximum area of  $\triangle AOB$  if O is the origin, (0, 0)? a) 1.5 b) 2 d) 5 e) 5.5 c) 4 N. 资外 Quadrilateral ABCD has sides that measure 7, 12, 15, and 10. 28. Four circles, each centered at one of the quadrilateral's D vertices, are mutually tangent as shown. Find the sum of the areas of the four circles. tule # # B PR a) 386π  $\tau$  b)  $121\pi$  c)  $129\pi$  c)  $129\pi$ Y. to the the B. Ph the the the 's the R to the life is 故 故 读 浅 10 50 1



multille m # " multine m # " multine m # " multille m # " multine m # " multille m # 3 33. Two tangent circles are inscribed in a semi-circle with a 1/3 196 Ro radius of 8 as shown. If the larger circle has a radius of 4, what is the radius of the smaller circle? Δ d)  $\sqrt{8}$ e) 3  $\sqrt{3}$ c)  $\frac{17}{8}$ b) 2 a) · 13 Ph Ro 8h 34. What is the probability that a triangle using three vertices of a regular hexagon is an isosceles triangle? b)  $\frac{1}{3}$ c)  $\frac{5}{12}$ d)  $\frac{2}{5}$  $e)\frac{1}{2}$ a) 6 如此新林客院 matinue ## # % PS ·K. \*\* Ro inte the the itute # 35. The areas of three small triangles are 40, 60, and 30 as seen in the picture. What is the area of triangle ABC? ·13 % · 13. 9% c) 225 d) 240 Ro a)<sup>3</sup>190 40 b) 200 e) 255 60 B Point P divides a line segment AB such that AP : PB = 2:3, and point Q divides the line segment such 36. Y. d) 60 trastitute ## e) 70 millitte # # that AQ: QB = 3:4. If PQ = 2, find AB. c) 50 35 b) 40 a) 面动机机都林塔路 mutute # # '& R ·3 9% · 3. 9% Ro 37. Consider a circle with a radius of 1 in a triangle which has sides 6, 8, and 10. If the circle rolled (like a wheel) along the edge of all the sides of  $\triangle ABC$  once (until it comes back to the starting position) as shown in the \*\*\*\* picture, what is the distance that the center P travelled? Y. hittle We the 资济 P. B e) 24 c) 14 d) 18 a) 10 b) 12 面动机机都林塔梯 mutute # # 'S PS mutule # # 'E R 而时间很新林塔梯 面的机能称林塔张 而此此他就林塔然 Y. to the the the 小学生 to the the the the the the the to the W. B. M. to the the B Ro

