State Mathematics Contest: Geometry

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May 3, 2001

Find the area of an equilateral triangle whose vertices lie on a circle with radius 2 cm.

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The following statements describe a race between: Pat, Chris, Jo, and Sam.

- i. Pat is 12 seconds behind the next runner.
- ii. The leader is 20 seconds ahead of the last person.
- iii. Chris is 1 second ahead of somebody.
- iv. Sam is 19 seconds ahead of Jo.
- Which of the following gives the order of the runners. (Runners listed from first to last.)

b. $3\sqrt{3}$ cm² c. $\sqrt{3}p$ cm² d. 6 cm²

a. Sam, Chris, Pat, and Jo

 $\mathbf{B}\boldsymbol{p} \,\mathrm{cm}^2$

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- b. Chris, Sam, Pat, and Jo
- c. Sam, Pat, Chris, and Jo
- stitute # # 13 PK d. Chris, Sam, Jo, and Pat
- e. Sam, Chris, Jo, and Pat
- 3. If a boat travels North for 5 miles then East for 12, then Southeast for 6, approximately how far is it from its starting point? 80
 - a. 13 miles b. 19.01 miles
- c. 23.21 miles d. 16.26 miles

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e. none of these

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Given the following two circles, find the algebraic equation of the chord they share in common. 4.

Circle I: $(x-1)^2 + (y+2)^2 = 9$ Circle II: $(x+3)^2 + (y-1)^2 = 16$ b. 3x + 4y = 1 c. 2x - y = 10

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- d. x 3y = 5a. 4x - 3y = 1e. none of these
- 5. The area of a 300' by 400' rectangle is doubled by adding a strip of width "w" around the perimeter. Approximately how wide is that strip? inte the the 'S' stitute 300



a. 87.50' b. 83.41' mythute ## # '& PL

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c. 72.84' d. 71.22'

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K 6.	Find the length of the 13 cm. a. $23 + \sqrt{69}$ cm b	perimeter of a right $0.16 + 2\sqrt{34}$ cm c	triangle whose area	a is 30 cm ² and who d. $7 + 3\sqrt{13}$ cm	e. none of these	Tastitut
R 7.	Find the area of a tria	ngle whose vertices b. 54 sq units c	are (0,0), (12, 9)	and (14, 6). d. 168 sq units	e. none of these	Tastitute
R 8.	Given that it is 3 o'cle hour hand? a. 15 min b	ock, exactly how lon	g will it take for the $16\frac{1}{3}$ min	minute hand to cat d. $16\frac{1}{2}$ min	ch up with the e. none of these	matitut
R 9.	If the size of a rectar of its sides is 4.5, wh a. 36 b	ngle's area is twice a at is the length of the b. 3.6 c	s large as the size of e other side?	f its perimeter, and d. 16	the length of one e. none of these	Maxitut
K 10.	A given circular cylin with diameter c inches a. $2\mathbf{p} \cdot c^3$ in ³ b	ndrical can is made us. What is the volu b. $\frac{p^2c^3}{4}$ in ³ c	up of a square piece me of this cylindrica $\frac{p^{3}c^{3}}{6}$ in ³	of metal and two calcan? d. 2.467 c^3 in ³	e. none of these	Institute
R 11.	Two chords \overline{AB} and long is \overline{DC} ?	$\frac{1}{DC}$ intersect each	n other so that AO	= 1.2, OB = 7.5, a	nd $OC = DO$. How	matint
R.	a. 6 units b. $\sqrt{8.7}$ units c. $\sqrt{35}$ units d. 8.7 units e. none of these	客 K matinte 称 林		C O B	R Thistitute # # # B	Mastitute
R.	AT HE HE WE HE	客 PK	B PR Institute An At B	FR. Institute An # 'S	R multille the to the particular	matitut
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23.	Find the height of a so length 2.	juare pyramid form	ned by four equilate	ral triangles whose si	des all have	situte
Turstee.	a. 1 b.	$\frac{\sqrt{6}}{2}$	c. $\sqrt{2}$	d. $\sqrt{3}$	e. none of these	fill Street
24.	If a rectangle whose le perimeter is kept cons	ength is 9 times its stant, what is the ra	width is modified s tio of length to wide	o that its area is doub h for the new rectan	bled but its gle?	linstitute
	a. $5 + \sqrt{7} : 5 - \sqrt{7}$	b. 2:1	c. $7 + \sqrt{5} : 7 - \sqrt{5}$	d. 1:1	e. $\sqrt{6} + 1: \sqrt{6} - 1$	
25.	One of the five staten Ann said, "If Bo said, "If th Chris said, "	nents below is false the car was not loo the tickets to the gar Ann's statement is	e and the other four cked then the walle ne are lost then An true"	are true. Who told t t was stolen." n's statement is false.	he falsehood?	linstitute
×K.	Dan said, "The Ed said. "The	ne tickets to the gai wallet was stolen	ne are not lost." but not the tickets to	o the game."	96	
Tristitute #	a. Ann	. Bo	c. Chris	d. Dan the the same and the same	e. Ed inte # 3	Institute
26.	A Quadrilateral ABC the angle at vertex C	CD is inscribed in is:	a circle. If the size	of the angle at vertex	A is 36° then	
tinstitute #	a. 72° b.	. 54° minute # *	c. 126°	d. 144° inter the 3	e. none of these	Institute
27.	The following facts ar be painted has an 8 fo inches) and four large paint do you need to t	e given: a gallon o oot ceiling, its dime e windows (72 by paint the walls?	f paint covers 400 sensions are 20 by 14 60 inches), and you	quare feet of wall spa 4 feet, it has two do 1 need two coats of p	ace, the room to ors (36 by 84 oaint. How much	26.
Tinstitute	a 1 47 gal h	2.06 gal	c 2.72 gal	d 103 gal	e none of these	mstitut
×.	a. 1.+7 gai. 0.	2.00 gai.	a.			
28.	For the points $(0, 2)$,	(6, 6) and $(10, 0)$	which of the follow	ing statements are tr	ue?	stitute
In Star.	II. The point III. The point III. The large	s form the vertices as form the vertices as angle is at the v	of an isosceles triater of an isosceles triater located on (6,	ngle. 6).	TTTTT.	finder.
100 tinstitute	a. only III b.	注 II and III	C, FI and III	d. all are true	e. none are true 3 %	mstitut
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multille m # 3 multinu m # 3 Institute m # " Institute \$ 75 'S Institute \$ **** matitute # # 3 加加斯林道際 29. Given you have 4 sticks, two of length 5 and two of length 8, with which you are to form a quadrilateral. If at least one of the angles is a right angle, how many different noncongruent quadrilaterals could you form. d. 4 c. 3 a. 1 b. 2 e. more than 4 A triangle with sides 6, 8, and 10 has its shortest side doubled in length while the other two sides 30. remain the same. What is the area of the new triangle? c. 15√7 d. $8\sqrt{30}$ a. 30 b. 40 e. none of these Y. What is the size of an angle between two adjacent sides of a regular 12 sided polygon? 31. c. $\frac{1080^{\circ}}{7}$ b. 120° d. 30° a. 144° e. none of these 32. As shown in the figure on the right six similar itute ## ## 'S triangles are each sharing one side with the next N. ILLE SAN HA 'S 物状 triangle and all are sharing one vertex. All angles at that vertex measure 60°. If the side of the last (smallest) triangle that is adjoining the first triangle is $\frac{1}{6}$ as large as the longest side of that first triangle, how many times larger is the area of the largest c. ³√6⁵ sittle # # '8 % b. √6⁵ Ro triangle as compared to the smallest? 36.itute # # withite the the a. 6 e. none of these 33. Three views of the same block are shown on the matinte # # '\$ right. What letter is on the side parallel to the side with the letter A? a. E b. O c. S d. H e. G 柳林飞 An arbelos is the region formed by three mutually tangent 34. circles whose centers are colinear, as noted in the image. If the diameters of the two smaller circles are a and b, what is the area of the arbelos. 4 e. none of these b. \sqrt{abp} Astitute # # 20%--se & K billitte # # S R. a. *ab***p** a. to the the B. Ph to the the B the to the We B The Y. to the the 's to the the B the the the B

