

Theta Individual and Team ANSWERS  
State Convention 2005

Individual Test Theta

1. C	11. A	21. C
2. B	12. B	22. D
3. D	13. C	23. A
4. C	14. B	24. B
5. B	15. D	25. D
6. A	16. A	26. B
7. A	17. C	27. A
8. D	18. D	28. C
9. D	19. C	29. C
10. C	20. D	30. C

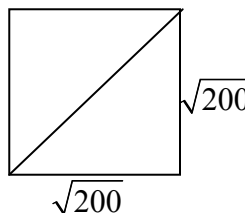
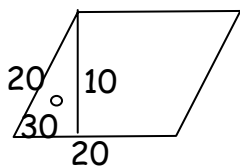
Team Answers Theta

1. $-\frac{3}{19}$
2. 20
3. 45
4. 27
5. 42
6. $\frac{21}{40}$
7. 4
8. 60
9. 408
10. $\frac{728}{5}$ or 145.6
11. 3510
12. 1299.9
13. B, C, D, A (in that order)
14. 4
15. $\frac{25}{16}$ or 1.5625

Solutions

1.  $\frac{x}{\frac{1}{2x}} = x \cdot 2x = 2x^2 = 30$  solves to  $\sqrt{15}$  since x is positive. Twice the number is  $2\sqrt{15}$ , **Choice C**.
2.  $2^{\sqrt{a}} \cdot 2^{2\sqrt{a}} = 2^{3\sqrt{a}}$  (adding exponents). **Choice B**.
3.  $1+3+5+7+9=25$ . **Choice D**.
4.  $m = 12/3 = 4$ ;  $4x - y = 2$ . The y-intercept is -2. **Choice C**.
5.  $n = \frac{k}{n^2}$  so  $n^3 = k$  and k must be a perfect cube. **Choice B** (16) cannot be correct.
6. If the side of the square is x, then  $4x = 2\pi k$  and solving for x gives  $\frac{\pi k}{2}$ . **Choice A**.
7. Bases  $\overline{DE}, \overline{AB}$ :  $\frac{1}{2}(3)(1+3) = 6$  which is **Choice A**.
8. Since the coefficients are positive, the slope of the first line is negative and the slope of the second line is positive. So we want the shaded region above the line with negative slope and above the positive line (since dividing by the negative will change the inequality sign).  
Region D is above both lines: **choice D**.
9. Multiplying each term by  $x(x-3)$  gives  $x - 2(x-3) = x-3$  and  $x - 2x + 6 = x-3$ ,  $x=9/2$  and  $9x=40.5$  which is **choice D**.
10. By the first equation, n can be either 2 or 6. By the second,  $0.5n$  can be 3 or 7. So n must be 6 for both to be true, **choice C**.
11. Dave will have  $100-4+5-6+5-8+5-10 = 87$ . **Choice A**.
12.  $a+b+c+d = 60(5) = 300$  and the sum of the first three is 40, so  $c+d=260$ . The average is half of that, 130. **Choice B**.
13. Using the change of base rule:  $\frac{\log x}{\log 2} = \log y$  so  $\frac{\log x}{\log y} = 2$ , and the answer is  $\log 2$ .  $\log 2 = \log(10/5) = \log 10 - \log 5 = 1 - \log 5$ . **Choice C**.
14.  $f(7/4) = \frac{1}{1-7/4} = -4/3$ ;  $f(-4/3) = \frac{1}{1+4/3} = 3/7$  and  $f(3/7) = \frac{1}{1-3/7} = 7/4$ . **Choice B**.
15. Since, for  $4-8x < 0$  the expression is equal to  $-(4-8x)$ . When  $4-8x < 0$ ,  $x > \frac{1}{2}$ , and if  $x > 1$  (given) then this is true. So  $-(4-8x)$  is the answer: **choice D**.
16.  $(0.90R)(1.20) = S$ ;  $\frac{27}{25}R = S$  and so  $9R = S(9)(\frac{25}{27}) = \frac{25}{3}S$ . **Choice A**.
17. A graph and its inverse cross on the line  $x=y$ , so the inverse also crosses at (2, 2). **Choice C**.
18.  $\frac{120}{360}(\pi r^2) = 300\pi$  solves to  $r=30$ . The circumference is  $60\pi$ , **choice D**.

19.  $A = 20(10) = 200$



diagonal =  $\sqrt{400} = 20$ . **Choice C**

Solutions

20. Let Vertex be  $(0, 10)$  and the lower right vertex of the square is  $(5, 0)$ .  $(y-10) = a(x-0)^2$   
 and  $0-10 = a(25)$  so  $a = -\frac{2}{5}$  and the latus is  $5/2 = 2.5$ . **Choice D.**

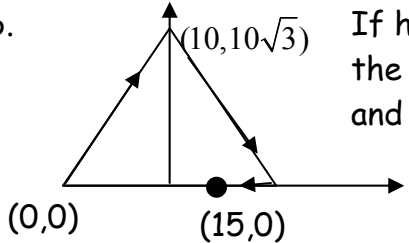
21.  $x+y=8$ , so  $4x+4y=32$ , and  $3z=47-32=15$ .  $z=5$ . **Choice C.**

22.  $1\#2=4-1=3$ .  $3@3=2(3)(3)=18$ . **Choice D.**

23.  $\log(ab)=c$  and since  $\log$  is base ten, and  $c$  is an integer, then  $ab$  is a multiple of 10.  $a$  or  $b$  can be 2 or 5, so choice C and D are false. **Choice A** is true.

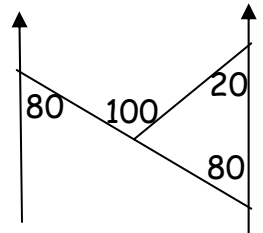
24. After the first pour, glass A has 10 mL of acid, and after the second pour, glass B has  $10+5=15$  mL of acid, and 25 ml total  $15/25=0.60$ . **Choice B.**

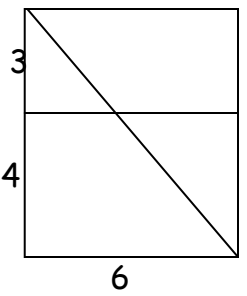
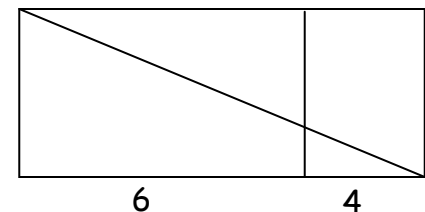
25. The graph is the reflection of the inverse of  $f$ , over the  $y$ -axis: **Choice D.**

26.  If he walks 45 ft, then he goes two sides, and ends up 5 ft from the vertex as shown. Get the distance from the two points shown and add 45 : 63.0 to the nearest tenth. **Choice B.**

27. The product of  $(1-i)$  and  $(1+i)$  is 2. The product of the roots for  $ax^2 + bx + c = 0$  is  $c/a$ , and in this case,  $b=2$ . **Choice A.**

28. The minor axis of the ellipse has length  $2b$ , which is 4. This is the diameter of the circle. and the area of the circle is  $.2^2 \pi$ . **Choice C.**

29.  Extend one line as shown. The remote interior angles should add to the exterior angle 100, so the angle near D is 80. By Alternate Interior angles are congruent, so angle BAE is also 80. **Choice C.**

30.  or  Open the walls to see clearly. We use the pythagorean theorem to compare the two possible paths:  $\sqrt{7^2 + 6^2}$  or  $\sqrt{10^2 + 3^2}$ . The shortest distance along the walls is  $\sqrt{85}$ . The shortest distance through the room is  $\sqrt{6^2 + 4^2 + 3^2} = \sqrt{61}$  and  $85-61=24$ . **Choice C.**