Mth 85 Practice for Exam 2 and the Final Exam *Franz Helfenstein* **NAME**

Simplify (removing parentheses and roots) and convert to positive exponents

1) $8^5 \cdot 8^2 =$	2) $x^2 \cdot x^7 =$	3) $(8x)^4 \cdot (⅜)^4 =$	4) $-5^{-2} =$
5) $10^7 \cdot 10^{-5} =$	6) $(17{,}384{,}678)^0 =$	7) $(5x^3)^2 =$	8) $(7 \cdot 10^3)^2 =$
9) $\sqrt{100x^5} =$	10) $\frac{10^{12}}{10^{16}} =$	11) $\frac{-z^{-5}}{z^3} =$	12) $\frac{x^5 \cdot y^4}{x^4 \cdot y^7} =$

Answer in Scientific Notation

13) $7200 \cdot 10^5 =$	14) $390 \cdot 10^{-7} =$	15) $0.00045 \cdot 10^8 =$	16) $8.3 \cdot 10^5 + 5.7 \cdot 10^5 =$
17) $6.9 \cdot 10^4 + 7 \cdot 10^3 =$	18) $7 \cdot 10^{-5} - 6.4 \cdot 10^{-4} =$	19) $(8.2 \cdot 10^5)(5.5 \cdot 10^2) =$	20) $(2.8 \cdot 10^{-7})(7.5 \cdot 10^3) =$
21) $15 \cdot (9.6 \cdot 10^{-2}) =$	22) $\frac{4.7 \cdot 10^5}{9.4 \cdot 10^2} =$	23) $(8 \cdot 10^5)^2 =$	24) $\sqrt{8.1 \cdot 10^{11}} =$

Applying Scientific Notation

25) Estimate the Earth's volume. Use $V = \frac{4\,\pi\, r^3}{3}$ and a radius of ≈ 4,000 miles to find the Earth's volume in cubic-feet. First convert 4,000 miles → feet

26) Estimate the gravity constant G. Use $G = F\,\frac{(R_E)^2}{M_E \cdot m}$ where R_E = Earth's radius ≈ $6.37 \cdot 10^6$ m, M_E = Earth's mass ≈$5.98 \cdot 10^{24}$ kg, F ≈ 9.807 N and m = 1 kg. i.e. At the Earth's surface there is a force of ≈9.807 N acting on a mass of 1 kg.

27) Estimate the time it takes for sunlight to reach the Earth. Use $T = \frac{D_{ES}}{c}$ and the speed of light, c ≈ $3 \cdot 10^8$ m/sec. The Earth Sun distance, $D_{ES} \approx 1.5 \cdot 10^{11}$ m.

28) Estimate the amount of fresh water needed on a yearly basis. Assume 7 billion people on Earth needing an average of 50 gal/day. Use 365 days/yr.

29) Estimate the amount of fresh water (gallons) contained in Crater Lake. Use $V = \frac{\pi\, R^2\, D}{3}$ (the volume of a cone), where the radius of Crater Lake, R ≈$1.5 \cdot 10^4$ ft, the depth of Crater Lake, D ≈ 1,932 ft and ≈ 7.5 gal/cu-ft.

30) Estimate the number of seedlings it would take to reforest the Biscuit fire, SW Oregon, 2002. The fire burned about one half million acres. Assume one seedling every 10 sq-ft. Fighting the fire cost about $150 million. What is the additional reforestation cost if a seedling + labor costs $2.50 each.

Solving for the Indicated Variable

31)	Solve for x	$9(3x - 7) = -3(13 - 5x)$	32)	Solve for x	$7 - 2(3x - 5) = 3(3 - 2x)$
33)	Solve for W	$P = 2L + 2W$	34)	Solve for Q	$7.2\,Q + 6.9 = 4.5(2.0\,Q - 1.4)$
35)	Solve for x	$\frac{2x}{3} + 4 = x + \frac{14}{3}$	36)	Solve for x	$\frac{3 - x}{2} + 3½ = 5 - \frac{3 \cdot (2x - 5)}{2}$
37)	Solve for x	$\frac{3a - 5x}{2} = -4b$	38)	Solve for x	$\frac{2x - 5}{3} = x - 4$
39)	Solve for y	$a(y - y_0) + b(x - x_0) = 1$	40)	Solve for b	$\frac{a - b}{4b} = 10a$
41)	Solve for a	$a \cdot w + 1 = \frac{a + b}{3}$	42)	Solve for b	$A = \frac{a + b}{2} \cdot h$
43)	Solve for x	$\sqrt{3x - 5} = 1$	44)	Solve for R	$A = 4\pi R^2$
45)	Solve for Q	$\sqrt{3Q + 1} - 1 = 3$	46)	Solve for x	$\frac{3\,x^2}{2} - \frac{5}{4} = x^2 + \frac{3}{4}$

47) Solve for z $\sqrt{a \cdot z^2 + b} - 1 = 0$

48) Solve for R $V = \frac{4\pi R^3}{3}$

49) Solve for W $F = \frac{1}{2} \cdot \sqrt{\frac{W}{L}}$

50) Solve for a $1 = \sqrt{\frac{a}{b}(x - y)}$

51) Solve for y $y = \sqrt{1 + y^2}$

52) Solve for b $D = \frac{\sqrt{b^2 - 4ac}}{2a}$

53) Solve for y $a \cdot x^2 + b \cdot y^2 = 1$

54) Solve for y $\sqrt{x^2 + y^2} = x$

Bearing Azimuth and Standard Angle

55) (a) Convert θ = 240° to its equivalent bearing. _____ (b) to its equivalent azimuth. _____

56) (a) Convert S 70° W to its equivalent azimuth. _____ (b) to its equivalent θ-angle. _____

57) (a) Convert 260° azi to its equivalent θ-angle._____ (b) to its equivalent bearing. _____

58) (a) Convert θ = -160° to its equivalent azimuth. _____ (b) to its equivalent bearing. _____

59) (b) Convert N 20° W to its equivalent θ-angle. _____ (b) to its equivalent azimuth. _____

60) (c) Convert 40° azi to its equivalent bearing. _____ (b) to its equivalent θ-angle. _____

61) (a) Give the back angle for θ = 220°. _____ (b) Give the back bearing for N 20° W. _____

62) (a) Convert NNW to its equivalent azimuth. _____ (b) Convert ESE to its equivalent θ-angle. _____

63) (a) Convert 829° to its primary θ-angle._____ (b) A pointer on a dial is currently at θ = 120°. The dial is rotated 870° clockwise. What is the pointer's new primary θ-angle? _____

Circles & DMS

64) Compute the **circumference** of a circle with a 7m radius.

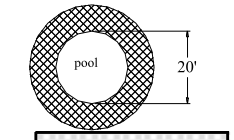
65) Compute (a) the **area** of a circle with a 65 ft radius, (b) with a 24" diameter.

66) Compute the **area** of a circle with a 124' 8" circumference.

67) Compute the **arc distance** when the radius is 250 ft and the subtended angle is 70°.

68) Compute the **area** covered by the sector described in the previous problem.

69) There are 420 ft^2 of tile available to cover a circular walkway around a 20 ft diameter pool. How wide a walkway will that make?

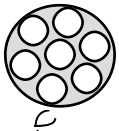


70) (a) How much **weight** will be removed if six 1" holes are drilled in a 4 lb 4" x 6" plate?

(b) How big should the holes be to reduce the plate's weight by 25%?

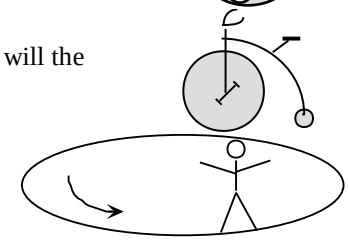
(c) What is the maximum weight reduction possible leaving a minimum 1/8" of metal?

71) How much unused space (shaded area) will there be when seven 2" conduits are packed in a pipe as shown?



72) The large wheel has a 3' dia and the small wheel has a 8" dia. How many degrees will the large wheel turn when the small wheel rotates exactly once.

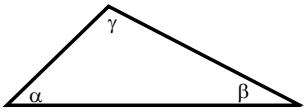
73) Determine the speed (in ft/sec) of the child on the carousel. The 20 ft diameter disk rotates at 6 rpm.



74) Find the missing angle of the triangle.

(a) α = 45° 30' 15" β = 30° 24' 55" γ =

(b) α = 46° 20' 30" β = 33° 54' 45" γ =



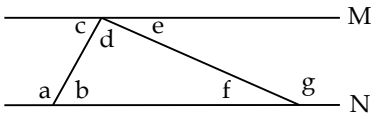
75) A ratchet turns a bolt 27° 35' with each pull. How many revolutions will occur after 37 pulls? (two decimal accuracy)

76) Compute in DMS: (a) ⅛(12° 54' 37" + 16° 39' 31") = (b) 3(16° 39' 31") =

77) How many degrees (DMS) between the hands of quarter after 7 o'clock?

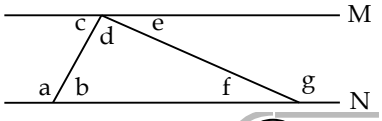
78) M ||N. a = 114°. d = 93°. Find angles

b= c= e= f= g=

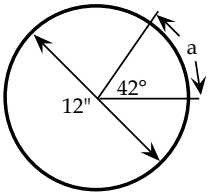


79) M ||N. g = 126°. d = 93°. Find angles

a= b= c= e= f=

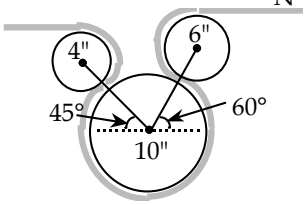


80) Find the length of arc a to the nearest 16th inch. Find the area of the pie shaped sector to the nearest sq-in.

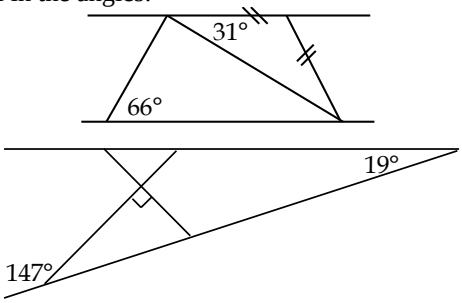


81) Find length of contact: (to nearest 16th ") (diameters shown)

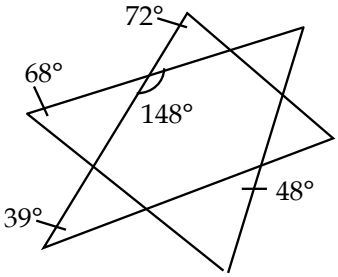
L=



82) Fill in the angles:

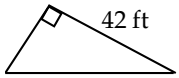


83) Fill in all the angles:

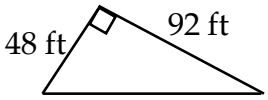


Pitch, Pythagorean Theorem & Similar Triangles

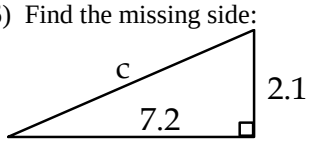
84) Find the missing side:



85) Find the missing side:



86) Find the missing side:

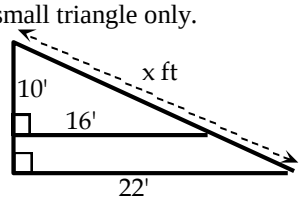


87) (a) Find the distance from (-4, 7) to (3, -5). (b) Find the distance from (1, 2, 1) to (3, 6, 12).

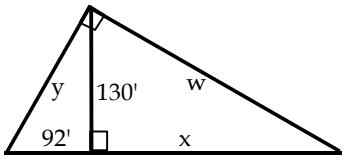
88) (a) Convert a 12% grade to an equivalent slope. (b) Convert a 7/12 pitch to its equivalent slope.

(c) Convert a slope of 1.2 to its equivalent pitch. (d) Convert a 0.02 slope to its equivalent pitch (nearest ⅛").

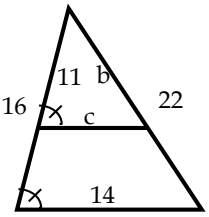
89) Find x. 10 ft is the height of the small triangle only.



90) Find the labeled sections:



91) Find b & c.

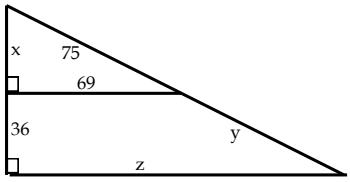


92) Find:

x=

y=

z=

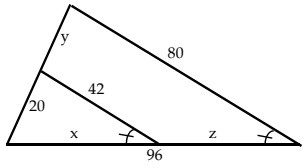


93) Find:

x=

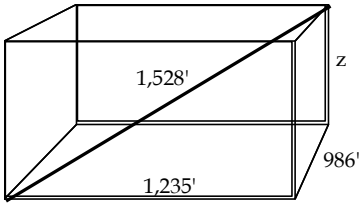
y=

z=



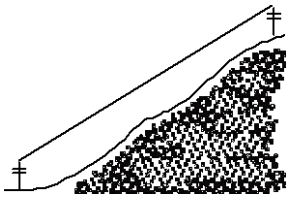
94) Find:

z=



95) Find the length of wire:

One pole is 300' N, 200' E and 150' above the other.

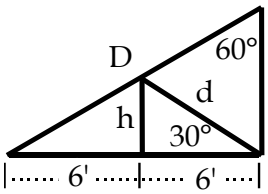


96) Find:

h=

d=

D=

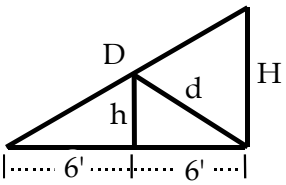


97) Find:

h= H=

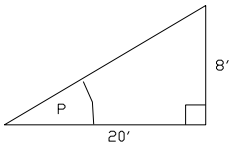
d= D=

use a 5/12 pitch



Find the missing side(s) and the slope (m), pitch (P) or %-grade (%G) where indicated

98)



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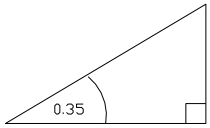
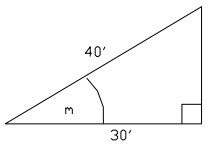


100)



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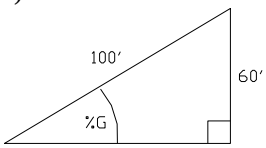
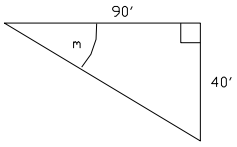
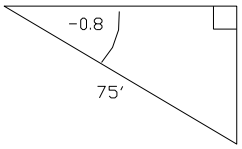


102)



103)



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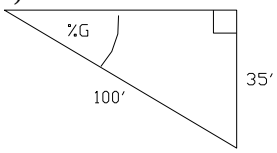

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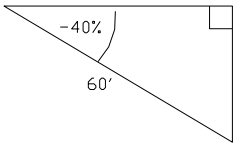
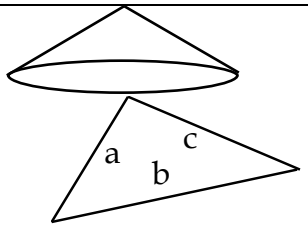


Answers-

1) 8^7	2) x^9	3) $3^4 x^4$
4) $-1/5^2$	5) 10^2	6) 1
7) $5^2 x^6$	8) $7^2 10^6$	9) $10 x^{2.5}$
10) $1/10^4$	11) $-z^2$	12) x/y^3
13) $7.2 \cdot 10^8$	14) $3.9 \cdot 10^{-5}$	15) $4.5 \cdot 10^4$
16) $1.4 \cdot 10^6$	17) $7.6 \cdot 10^4$	18) $-5.7 \cdot 10^{-4}$
19) $4.51 \cdot 10^8$	20) $2.1 \cdot 10^{-3}$	21) $1.44 \cdot 10^0$
22) $5 \cdot 10^2$	23) $6.4 \cdot 10^{11}$	24) $9 \cdot 10^5$
25) $V_E = 4 \cdot 10^{22}$ ft^3	26) $6.7 \cdot 10^{-11}$ N m^2/kg^2	27) $5 \cdot 10^2$ sec ≈ 8 min
28) $1.3 \cdot 10^{14}$ gal	29) $3.4 \cdot 10^{12}$ gal	30) $2 \cdot 10^9$ seedlings, $5.5 billion
31) x = 2	32) Ø	33) $W = (P - 2L)/2$
34) Q = 7⅓ or Q ≈ 7.33	35) x = -2	36) x = 3
37) $x = (3a + 8b)/5$	38) x = 7	39) $y = (1 - bx + bx_0 + ay_0)/a$
40) $x = a/(40a + 1)$	41) $a = (b - 3)/(3w - 1)$	42) $b = (2A - ah)/h$
43) x = 2	44) $R = \pm\sqrt{A/4\pi}$	45) Q = 5
46) x = ± 2	47) $z = \pm\sqrt{(1 - b)/a}$	48) $R = (3V/4\pi)^{⅓}$
49) $W = 4LF^2$	50) $a = b/(x - y)$	51) Ø
52) $b = \pm\sqrt{4\,a^2 D^2 + 4ac}$	53) $y = \pm\sqrt{(1 - ax^2)/b}$	54) y = 0
55) S30 W, 210ºazi	56) 250º azi, -160º or +200º	57) +190º or -170º, S 80º W
58) 250ºazi, S 70º W	59) , +110º or -250º, 340º azi	60) N 40º E, 50º
61) +40º azi, S 20º E	62) 337½º azi, -22½º	63) 109º, +330º or -30º
64) 43.98 m	65) 13,273 sq-ft, 3.14 sq-ft	66) 1,237 sq-ft
67) 305.43'	68) 38,179 sq-ft	69) 5.29'
70) 0.79#, 1⅛", 2.58#	71) 2π sq-in	72) 80º
73) 2π fps	74) 104º 4' 50", 99º 44' 45"	75) 2.83 rev
76) 3º 41' 46", 49º 58' 33"	77) 127º 30'	78) 66º, 66º, 21º, 21º, 159º
79) 147º, 33º, 33º, 54º, 54º	80) 4.40", 13.19 sq-in	81) 37 7/16"
82) *	83) *	84) 48.29'
85) 103.77'	86) 7.50'	87) 13.89, 11.87
88) 0.12, 0.58, 14.4/12, ¼/12	89) 25.94'	90) x=183.70', y=159.26', z=225.04'
91) b=15.13, c=9.63	92) x=29.39, y=91.86, z=153.51	93) x=50.40, y=18.10, z=45.60
94) Ø	95) 390.51'	96) h=3' 5 9/16", d=H, D=13' 10¼"
97) h=2½', H=5', d=5', D=13'	98) D=21.54', P=4.8/12	99) D=21.19, H=7'
100) m=0.88, H=26.40'	101) G=75%, B=80'	102) m=-4/9, D=98.49'
103) B=58.57', H=-46.85	104) G=-37.36%, B=93.67'	105) m=0.66, H=-33.17'

Areas, Volumes and Miscellaneous Problems

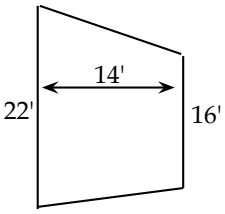
68) Find the volume of the conical pile of gravel with a 64 ft diameter and 28 ft high. How many 12 cu-yd truck loads would be needed to create such a pile?



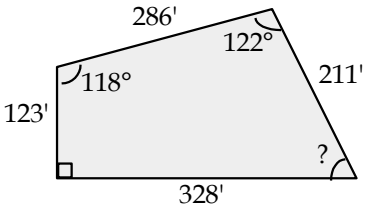
69) Find the area of this triangle using Hero's formula:

$s = \frac{a+b+c}{2}$ Area $= \sqrt{s(s-a)(s-b)(s-c)}$ a=37', b=45', c=26'

70) Find the area of the trapezoid.

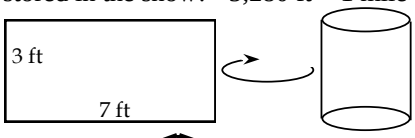


71) Find the area and missing angle:



72) A conical mountain is covered by 6 ft of snow which has 50% water content. The mountain is 3,000 ft tall and 6 miles wide. Approximately (2 signif. digits) how many cubic yards of water are there stored in the snow? 5,280 ft = 1 mile

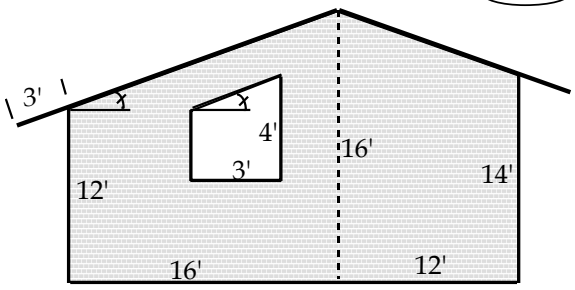
73) A barrel is made from rolling a 3 ft x 7 ft piece of sheet metal into a cylinder with the edges just touching. What are the dimensions of the barrel? How many gallons will it hold? **note**: 7.48 gallons ≈ 1 cu-ft



74) What is the total length of each rafter?
The eaves are 3' long as shown.

(a) How much siding is needed?

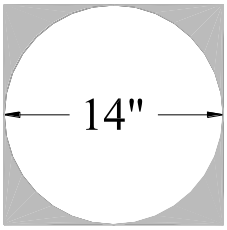
(b) How much glass is in the window?



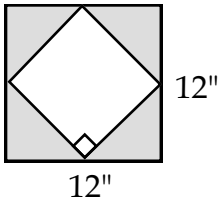
75) Plot the points (0,0), (2,5), (10,7), (8,2). What is this figure called? What is its enclosed area?

76) Plot the points (5, 4), (-4, -3), (-6, 2), (6, -4). What is its enclosed area?

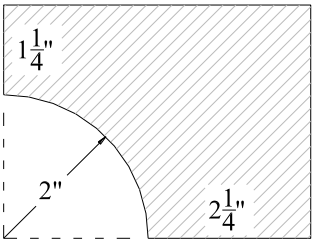
77) Find the shaded area.



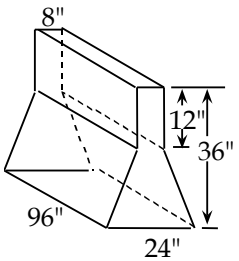
78) Find the shaded area.



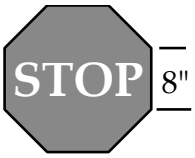
79) Find the shaded area.



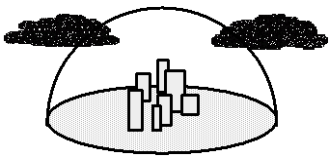
80) How many cubic **feet** in each traffic divider as shown?



81) Find the area of the stop sign.



82) How much glass is in the dome of a domed city if the base is 2 miles across? Answer in sq-ft.

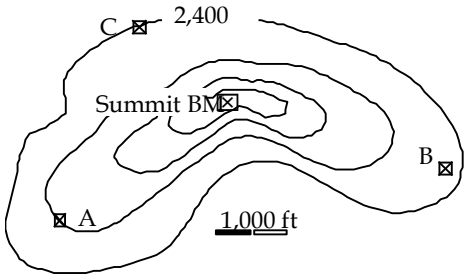


83) Use the map's scale with 100 ft

(a) Find the average slope from A

85) Find shaded area.

contour intervals 25)

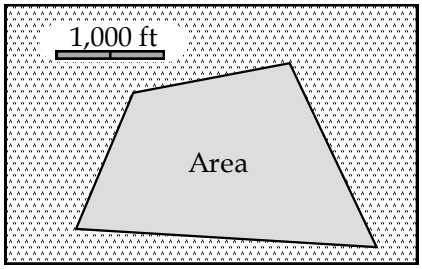


to the Summit BM (3,160') as a % grade.

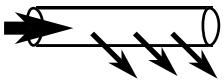
(b) Find the average slope from B to the Summit BM (3,160') as a % grade.

(c) Find the average slope from C to the Summit BM (3,160') as a % grade.

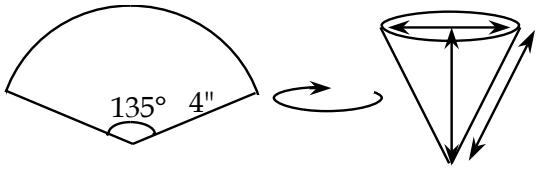
(nearest 1,000 sq ft)



86) With an 8" water main and each house tapped in with a 3/4" line and only 10% of the houses using their water at one time how many houses can this main serve and maintain pressure?



87) What are the dimensions of the dixie cup made from this pie shaped section?



88) What are the dimensions of the pie shaped piece that would make a Dixie-cup 4" wide and 6" deep?