

Final Exam Review: Practice Set A

Name: Key!

Math 3

1. A floor has tiles arranged in 9 consecutive circles. The innermost circle contains 9 tiles. Each successive circle contains 9 more tiles than the previous. How many tiles are there in total?

A) 81 B) 396 **C) 405** D) 729

$$\begin{array}{r} 9 \\ 18 \\ 27 \\ 36 \\ 45 \\ 54 \\ 63 \\ 72 \\ 81 \end{array} \left. \vphantom{\begin{array}{r} 9 \\ 18 \\ 27 \\ 36 \\ 45 \\ 54 \\ 63 \\ 72 \\ 81 \end{array}} \right\} = 405$$

2. Let $f(x) = x^3 - 6x^2 + 10x - 8$ and $g(x) = x - 4$. What is the solution set for $\frac{1}{2}f(x) = g(x)$?

A.) -2, -4, 3 **B) 0, 2, 4** C) -4, -2, 0 D) -1, -2, 2

$$\begin{aligned} \frac{1}{2}(x^3 - 6x^2 + 10x - 8) &= x - 4 \\ x^3 - 6x^2 + 10x - 8 &= 2x - 8 \\ x^3 - 6x^2 + 8x &= 0 \\ x(x^2 - 6x + 8) &= 0 \\ x(x-4)(x-2) &= 0 \end{aligned}$$

$$x = 0 \quad x = 4 \quad x = 2$$

- 3-A. The equations $2x^2 + 3x = 4$ is rewritten in the form $2(x-h)^2 + q = 0$. What is the value of q ?

A) -4 **B) -41/8** C) 41/8 D) 4

$$2x^2 + 3x - 4 = 0$$

$$y = 2(x + 0.75) - 5.125$$

graph, find vertex
 $(-0.75, -5.125)$

- 3-B. The equations $2x^2 + 3x = 4$ is rewritten in the form $2(x-h)^2 + q = 0$. What is the value of h ?

A) -2 **B) -3/4** C) 3/2 D) 2

- 4) A box with an open top is going to be constructed from a rectangular piece of cardboard.

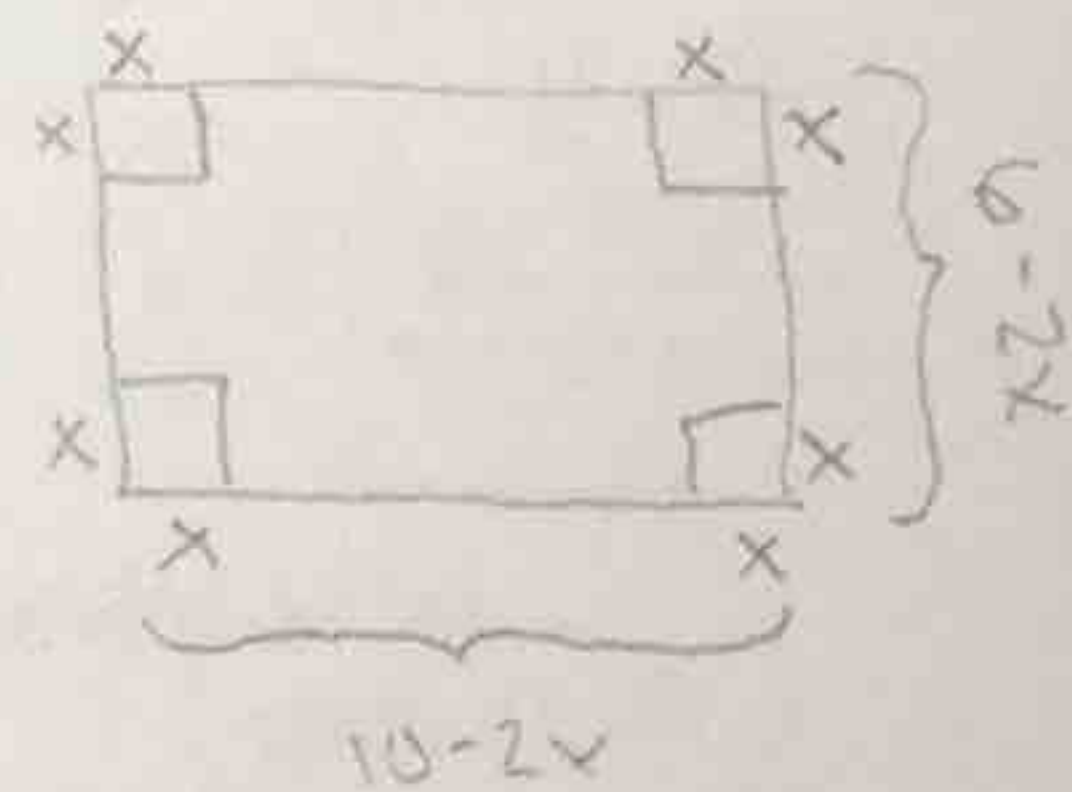
- The cardboard measures 6 x 10 inches.
- The box is formed by cutting equal sized squares of side x , from the corners of the cardboard, then folding the sides up.

What is the domain of the function $V(x)$ that gives the volume of the box?

$$V = x(10 - 2x)(10 - 2x)$$

A) $0 < x < 3$ B) $0 < x < 5$ C) $0 < x < 6$ D) $0 < x < 10$

graph, find where x -values are positive
(x , height, can't be zero or negative)



$$V = Lwh$$

5. A function is shown: $f(x) = \begin{cases} -x^2 + 3x & x \leq -2 \\ 4(x)^3 & -2 < x < 1 \\ \frac{x+5}{x-1} & x \geq 1 \end{cases}$

What is the value of $f(-2) + 2f(-1) - f(3)$

A) -22 B) -2 C) -10 D) 18

$$f(-2) = -1(-2)^2 + 3(-2) = -10$$

$$f(-1) = 4(-1)^3 = -4$$

$$f(3) = \frac{3+5}{3-1} = \frac{8}{2} = 4$$

$$-10 + 2(-4) - 4 = -22$$

6. Which equation goes to positive infinite the fastest as x goes to infinity?

- A) $y = 50x^2$ B) $y = \frac{1}{2}x^3$ C) $y = 5\ln x$ D) $y = 2e^x$

graph, look at which y-values increase the fastest.

7. Which expression is equivalent to: $\frac{\tan\theta(\sin^2\theta - \cos^2\theta)}{(\sin^4\theta - \cos^4\theta)}$ ← Difference of squares

A) $\frac{\tan\theta}{\sin^2\theta - \cos^2\theta}$

B) $\tan\theta(\sin^{\frac{1}{2}}\theta - \cos^{\frac{1}{2}}\theta)$

C) $\tan\theta$

D) $\frac{1}{2}\tan\theta$

$$\frac{\tan\theta(\sin^2\theta - \cos^2\theta)}{(\sin^2\theta + \cos^2\theta)(\sin^2\theta - \cos^2\theta)}$$

$$\frac{\tan\theta}{\sin^2\theta + \cos^2\theta} = \frac{\tan\theta}{1} = \tan\theta$$

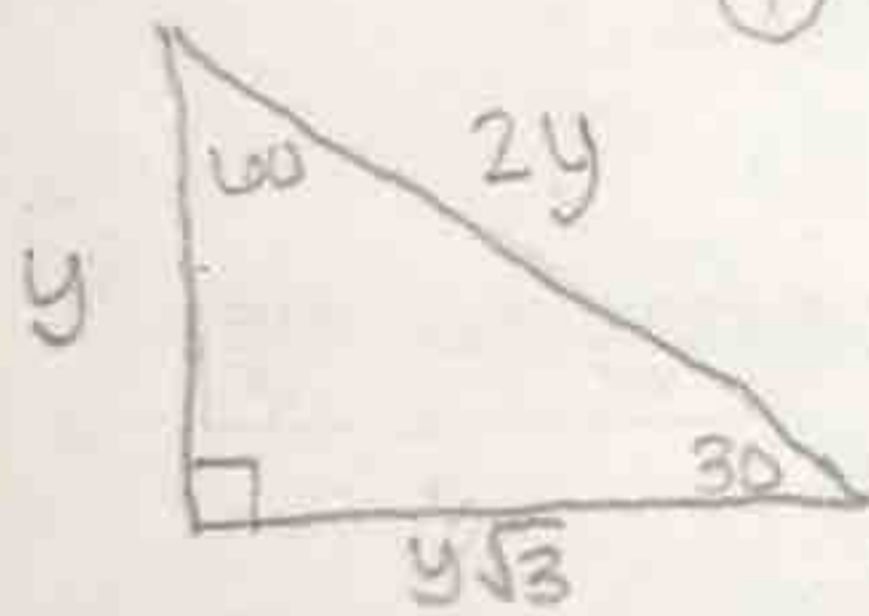
8. The diameter of an apple pie is 10 inches. If the intercepted arc (the crust) is 4 inches, what is the measure of the central angle made by cutting your slice of pie. Give your answer in radians.

- A) 6π B) $\frac{2}{5}$ C) $\frac{4}{5}$ D) $\frac{4\pi}{5}$

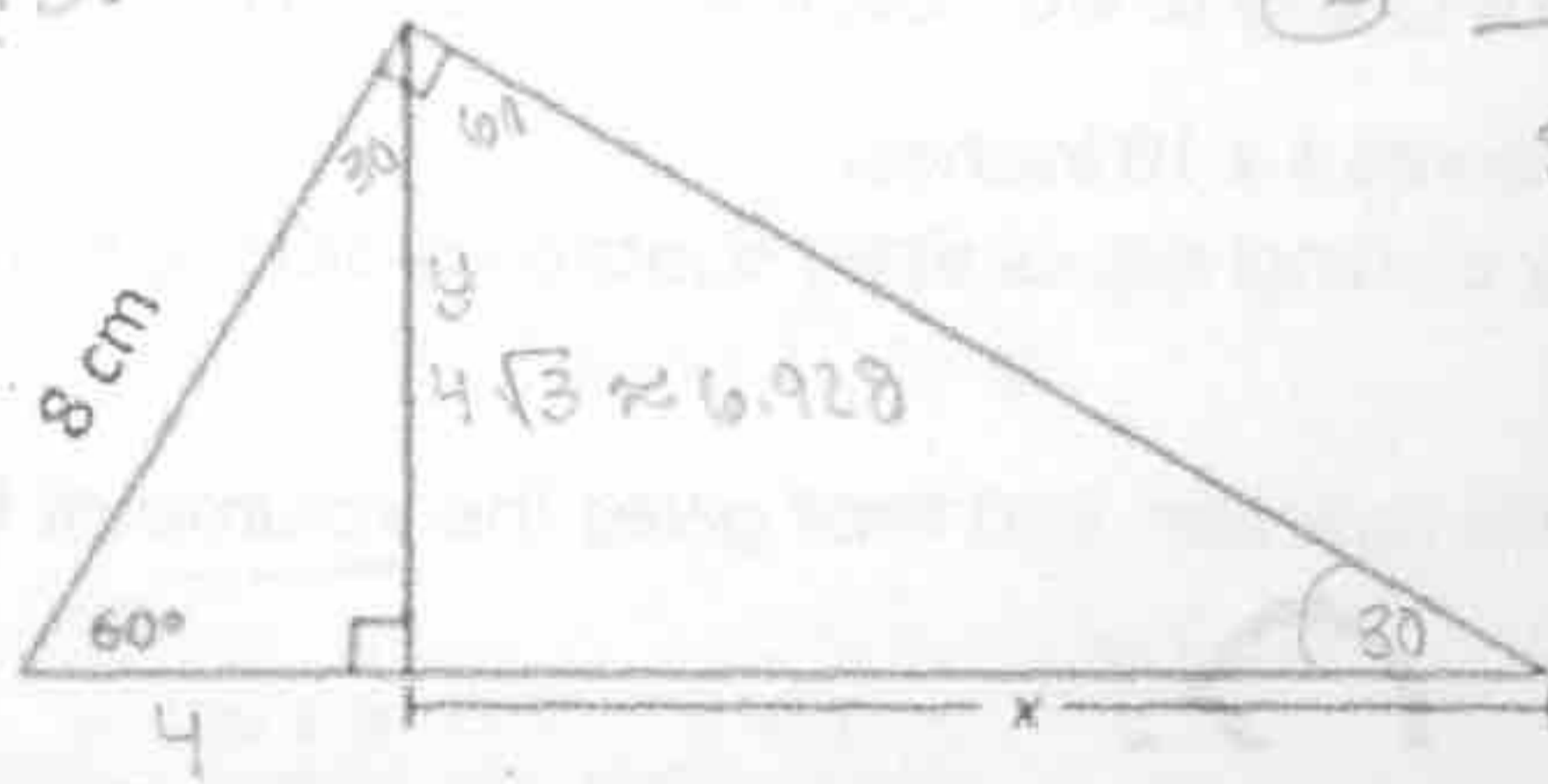
Arc Length = θr
 $4 = \theta(5)$
 $\theta = \frac{4}{5}$

in radians!

9. What is the value of x in the triangle below? Two ways:



① special Right Δ 's:
 $x = y\sqrt{3}$
 $4\sqrt{3} = y$
 $x = 4\sqrt{3}(\sqrt{3})$
 $x = 12$



② Trig: *Degree Mode*
 $\sin 60 = \frac{y}{8}$
 $y = 8 \sin 60$
 $y = 6.928$
 $\tan 60 = \frac{x}{6.928}$
 $x = 6.928 \tan 60 = 12$

- A) $16\sqrt{3}$ cm B) 16 cm C) $8\sqrt{3}$ cm D) 12 cm

10. The amount of tissue paper used to cover a spherical ball is 900 square inches. What is the volume of the ball?

$900 = 4\pi r^2$
 $\frac{225}{\pi} = r^2$
 $\frac{15}{\sqrt{\pi}} = r$

$SA = 4\pi r^2$

$V = \frac{4}{3}\pi r^3$

$V = \frac{4}{3}\pi \left(\frac{15}{\sqrt{\pi}}\right)^3$

A) 4500π units cubed

B) $\frac{4500}{\sqrt{\pi}}$ units cubed

C) $300/\pi$ units cubed

D) $300\sqrt{\pi}$ units cubed

$V = \frac{4}{3}\pi \left(\frac{15}{\sqrt{\pi}}\right)\left(\frac{15}{\sqrt{\pi}}\right)\left(\frac{15}{\sqrt{\pi}}\right)$
 $V = \frac{4}{3}\pi \left(\frac{3375}{\pi\sqrt{\pi}}\right)$
 $V = \frac{4500}{\sqrt{\pi}}$

A farmer wants to buy between 100 and 125 acres of land. He is willing to pay up to \$950 an acre.

There is a rectangular field for sale that is 300 by 1,500 yards that is selling for \$87,000. Would this property meet the farmer's requirements?

(1 acre = 43,560 ft²)

- A) Yes, the land is the right size and the price is low enough
- B) No, the price is low enough, but there is too much land
- C) No, the price is low enough, but there is not enough land
- D) No, the land is the right size, but the price is too high

900 ft x 4500 ft

= 4,050,000 = 92.98 acres

$\frac{87000}{92.98} = \$935.73/\text{acre}$

12. A student reporter wants to know the percentage of college students would be in favor in a small raise in student tuition to update the college facilities. Who would represent his population if he were to take a poll?

- A) The total state population
- B) All adults in the state
- C) All students at that college
- D) A random sample of students at that college

13. In a set of test scores that is normally distributed, a score of 52 is one standard deviation below the mean, and a score of 70 is two standard deviations above the mean. What was the mean scores?

A) 9

B) 18

C) 58

D) 61

$X - 52 = \frac{70 - X}{2}$

$2X - 104 = 70 - X$

$3X = 174$

$X = 58$

14. Which expression is equivalent to: $\sin\theta \left(\frac{\sin\theta}{\cos\theta} + \frac{\cos\theta}{\sin\theta} \right)$

$\sin\theta \left(\frac{\sin\theta \sin\theta}{\cos\theta \sin\theta} + \frac{\cos\theta \cos\theta}{\sin\theta \cos\theta} \right)$

A) $\sin\theta$

B) $\sin^2\theta + \cos\theta$

C) $\frac{1}{\cos\theta}$

D) $\frac{\sin\theta}{\cos\theta}$

$= \sin\theta \left(\frac{\sin^2\theta + \cos^2\theta}{\sin\theta \cos\theta} \right)$

$= \sin\theta \left(\frac{1}{\sin\theta \cos\theta} \right)$

$= \frac{1}{\cos\theta} = \sec\theta$

15. The radii of two concentric circles are 5 and 4. Find the length of the Chord.

A) 3

B) 6

C) 9

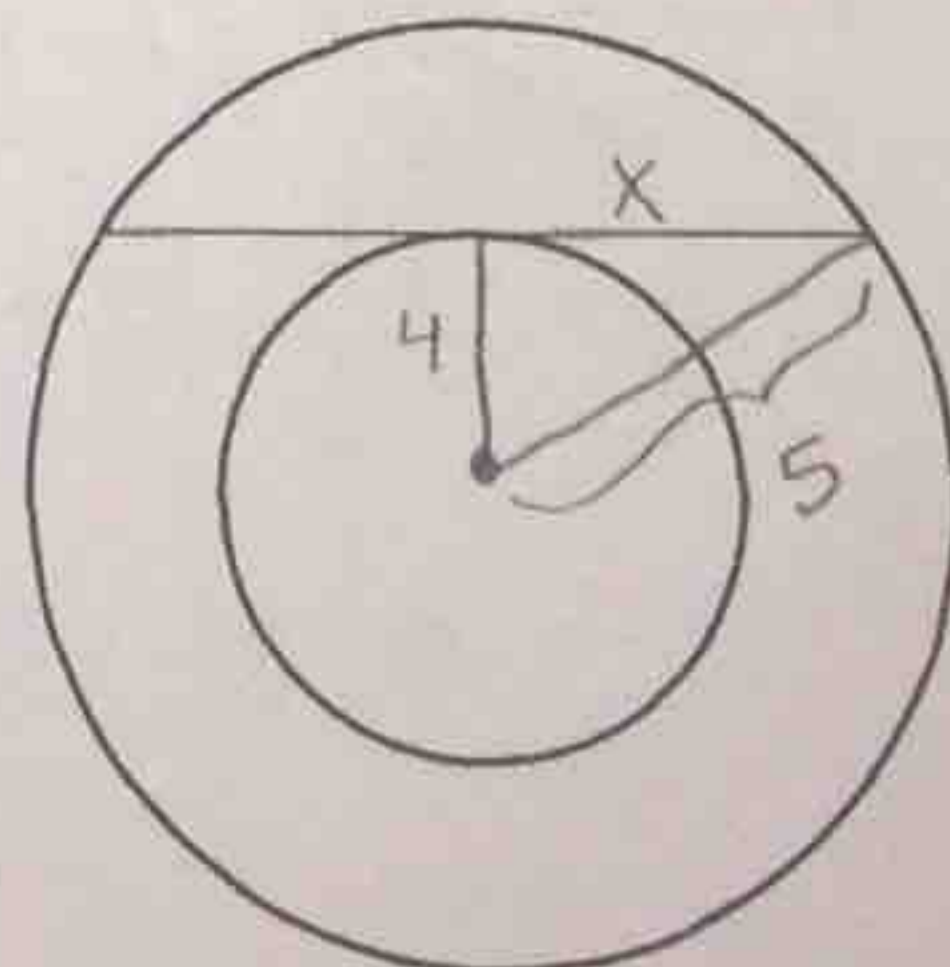
D) 18

$x^2 + 4^2 = 5^2$

$x^2 = 9$

$x = 3$

chord = $2x = 6$



16. What is the approximate length of the arc on a circle formed by an angle of $5\pi/3$ radians, and a radius of 5.

ARC length = θr
 $AL = \frac{5\pi}{3} (5)$
 $AL = 26.167$

- A) 13.08 B) 25.17 **C) 26.17** D) 65.45

17. The length and width of a rectangular prism are $2\sqrt{5}$ and $4\sqrt{10}$ respectively. What could the height be if the volume is a rational number?

$V = LWH$

- A) $2\sqrt{2}$** B) $2\sqrt{3}$ C) $2\sqrt{5}$ D) $2\sqrt{6}$

18. Which is a solution to the equation $\frac{x+3}{x-4} = \frac{x+2}{x-3}$ *CROSS multiply!*

$(x+3)(x-3) = (x+2)(x-4)$
 $x^2 - 9 = x^2 - 2x - 8$
 $-9 = -2x - 8$
 $-1 = -2x$
 $x = 1/2$

- A) $1/2$** B) -1 C) 1 D) 2

19. Which function is equivalent to $y = x^2 - 8x + 3$

- A) $y = (x-4)^2 - 1$
 B) $y = (x-4)^2 - 7$
C) $y = (x-4)^2 - 13$
 D) $y = (x-4)^2 + 7$

$y - 3 = x^2 - 8x$ $(\frac{-8}{2})^2 = (-4)^2 = 16$
 $y - 3 + 16 = x^2 - 8x + 16$
 $y + 13 = (x-4)^2$
 $y = (x-4)^2 - 13$

20. Which expression is equivalent to $\frac{x+3}{x^2-4} \div \frac{x+7}{x^2+9x+14}$

- A) $3/2$ B) 1 C) $\frac{x+10}{x-2}$ **D) $\frac{x+3}{x-2}$**

$\frac{x+3}{(x-2)(x+2)} \cdot \frac{(x+7)(x+2)}{(x+7)} = \frac{x+3}{x-2}$