Math III 2014-2015 Exam Review $\sqrt{2}, \pi$ Name Key

real → irrational
real → rational → integer → whole → natural
$\frac{1}{3}, 0.5$ $-2,-1,0,1,2$ $0,1,2,3$ $1,2,3$

N-RN.3

1. What number set does the sum of $\frac{1}{2}$ and $\frac{1}{3}$ belong?
   A. Irrational (B.) Rational C. Whole D. Natural $\frac{1}{2}+\frac{1}{3}=\frac{5}{6}$

2. What number set does the product of $\frac{1}{2}$ and $\frac{1}{3}$ belong?
   A. Irrational (B.) Rational C. Whole D. Natural $\frac{1}{2}\cdot\frac{1}{3}=\frac{1}{6}$

3. What number set does the sum of $\frac{1}{2}$ and $\sqrt{2}$ belong?
   (A.) Irrational B. Rational C. Whole D. Natural

4. What number set does the product of $\frac{1}{2}$ and $\sqrt{2}$ belong?
   (A.) Irrational B. Rational C. Whole D. Natural

N-CN.7

1. What are the roots to $f(x)=x^2+2x+2$?
   A. $1,-1$ (B.) $-1+i,-1-i$ C. $1+i,1-i$ D. $-2i,2i$
   $\frac{-2\pm\sqrt{(2)^2-4(1)(2)}}{2} = \frac{-2\pm\sqrt{-4}}{2} = \frac{-2\pm 2i}{2} = -1\pm i$

2. What are the zeros to $f(x)=x^2-6x+25$?
   (A.) $3+4i,3-4i$ C. $5+3i,5-3i$
   B. $-3+4i,-3-4i$ D. $-5+3i,-5-3i$
   $\frac{6\pm\sqrt{(-6)^2-4(1)(25)}}{2} = \frac{6\pm\sqrt{-64}}{2} = \frac{6\pm 8i}{2} = 3\pm 4i$

3. What are the roots to $4x^2-4x=-17$?
   $4x^2-4x+17=0$
   (A.) $\frac{1\pm 4i}{2}$ C. $\frac{-1\pm 4i}{2}$
   B. $\frac{1\pm 12i\sqrt{2}}{2}$ D. $\frac{-1\pm 12i\sqrt{2}}{2}$
   $\frac{4\pm\sqrt{(-4)^2-4(4)(17)}}{8} = \frac{4\pm\sqrt{-256}}{8} = \frac{4\pm 16i}{8} = \frac{1\pm 4i}{2}$

4. What are the zeros of $5x^2-2x=-4$?
   $5x^2-2x+4=0$
   A. $\frac{1\pm 2i\sqrt{21}}{5}$ (C.) $\frac{1\pm i\sqrt{19}}{5}$
   B. $\frac{-1\pm 2i\sqrt{21}}{5}$ D. $\frac{-1\pm i\sqrt{19}}{5}$
   $\frac{2\pm\sqrt{(-2)^2-4(5)(4)}}{2(5)} = \frac{2\pm\sqrt{-76}}{10} = \frac{2\pm 2i\sqrt{19}}{10} = \frac{1\pm i\sqrt{19}}{5}$

A-SSE.3

1. What value of h is needed to complete the square in order to find the vertex?

$$x^2 - 4x + 9 = (x - h)^2 + 5$$

$x^2 - 4x + 4 = -9 + 4$ $\quad \left(\frac{-4}{2}\right)^2 = 4$

$(x-2)^2 = -5$

$(x-2)^2 + 5$

$h = 2$ vertex $(2, 5)$

A. $h = 2$, vertex (-2, 5)
C. $h = -2$, vertex (-2, 5)
B. $h = 2$, vertex (2, 5)
D. $h = -2$, vertex (2, 5)

2. What is the value of h is needed to complete the square in order to find the vertex?

$$x^2 + 2x + 7 = (x - h)^2 + 6$$

$x^2 + 2x + 1 = -7 + 1$ $\quad \left(\frac{2}{2}\right)^2 = 1$

$(x+1)^2 = -6$

$(x+1)^2 + 6$

$h = -1$ vertex $(-1, 6)$

A. $h = 1$, vertex (1, 6)
C. $h = -1$, vertex (1, 6)
B. $h = 1$, vertex (-1, 6)
D. $h = -1$, vertex (-1, 6)

3. What value of k is needed to complete the square in the order to find the vertex?

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

$x^2 - 2x + 1 = -4 + 1$ $\quad \left(\frac{-2}{2}\right)^2 = 1$

$(x-1)^2 = -3$

$(x-1)^2 + 3$

$h = 1$ vertex $(1, 3)$

A. $h = 1$, vertex (1, 3)
C. $h = -1$, vertex (1, 3)
B. $h = 1$, vertex (-1, 3)
D. $h = -1$, vertex (-1, 3)

A-APR.2

1. Determine which of the following is a factor of $x^3 + x^2 - 16x - 16$? graph roots $x = -4, -1, 4$ so $(x+4)(x+1)(x-4)$

A. $x - 1$ B. $x + 4$ C. $x + 2$ D. $x - 2$

2. Which of the following is a root of $3x^3 + 10x^2 - x - 12$? graph roots $-3, 1$, and one more

A. -2 B. -1 C. 1 D. 2

3. A root of $x^3 - 6x^2 + 11x - k$ is $(x - 2)$. What is the value of k?

A. 2 B. -2 C. 6 D. -6

2 | 1 -6 11 -K
2 -8 6
1 -4 3 0

$K = 6$

4. Which of the following is not a factor of $x^3 + 2x^2 - x - 2$? graph roots $-2, -1, 1$ $(x+2)(x+1)(x-1)$

A. $x - 1$ B. $x + 1$ C. $x - 2$ D. $x + 2$

A-APR.4

1. Simplify $(x+y)^2$

   A. x^2+y^2 B. x^2-y^2 C. $x^2+2xy+y^2$ D. $x^2+(xy)^2+y^2$

2. Simplify $(x^2+y^2)^2$

   A. x^4+y^4 B. x^2-y^2 C. $x^4+2x^4y^4+y^4$ D. $x^4+2x^2y^2+y^4$

3. Simplify x^3+27

   A. $(x+3)(x^2-3x+9)$ C. $(x+9)(x^2-18x+27)$

   B. $(x+3)(x^2+3x+9)$ D. $(x+3)(x^2-3x+27)$

A-APR.6

1. Which of the following is equivalent to $x^2-11x+37+\frac{-128}{x+4}$?

   A. $\frac{x^3+3x^2-x-3}{x+4}$ C. $\frac{x^3-4x^2+6x-4}{x+4}$

   B. $\frac{x^3-7x^2-7x+20}{x+4}$ D. $\frac{3x^3+17x^2+21x-9}{x+4}$

$-4 \mid 1 \quad -7 \quad -7 \quad 20$

$\quad\quad -4 \quad 44 \quad -148$

$1 \quad -11 \quad 37 \quad -128$

So $x^2-11x+37\ \frac{-128}{x+4}$

2. Which of the following is equivalent to $x-6+\frac{13}{x+1}$?

   A. $\frac{x^2-5x+7}{x+1}$ C. $\frac{x^2-7x+10}{x+1}$

   B. $\frac{6x^2-8x-2}{x+1}$ D. $\frac{x^2+3x-2}{x+1}$

$-1 \mid 1 \quad -5 \quad 7$

$\quad\quad -1 \quad 6$

$1 \quad -6 \quad 13$

So [illegible]

$x-6+\frac{13}{x+1}$

A-APR.7

1. Simplify $\frac{4x^2-1}{2x^2-5x-3} \cdot \frac{x^2-6x+9}{2x^2+5x-3}$ $= \frac{(2x+1)(2x-1)}{(2x+1)(x-3)} \cdot \frac{(x-3)(x-3)}{(2x-1)(x+3)} = \frac{x-3}{x+3}$

   A. 1 B. $x+3$ C. $x-3$ D. $\frac{x-3}{x+3}$

2. Simplify $\frac{x^2-3x-10}{2x^2-11x+5} \div \frac{x^2-5x+6}{2x^2-7x+3}$ $= \frac{(x-5)(x+2)}{(2x-1)(x-5)} \cdot \frac{(2x-1)(x-3)}{(x-2)(x-3)} = \frac{x+2}{x-2}$

   A. $\frac{x-2}{x+2}$ B. $\frac{x+2}{x-2}$ C. $\frac{x-5}{x+5}$ D. $\frac{x+5}{x-5}$

3. Which expression equals $\frac{1}{x^2-2x-3}+\frac{1}{x^2-4x+3}$? $= \frac{1}{(x-3)(x+1)}+\frac{1}{(x-3)(x-1)}$

$\frac{x-1}{(x-3)(x+1)(x-1)}+\frac{x+1}{(x-3)(x+1)(x-1)}=\frac{2x}{\text{"}}$

A. $\frac{2x-1}{(x-1)(x+3)(x+1)}$ C. $\frac{2x+1}{(x-1)(x+1)(x-3)}$

(B.) $\frac{2x}{(x-1)(x+1)(x-3)}$ D. $\frac{2x}{(x+3)(x-1)(x+1)}$

4. Which expression equals $\frac{5x}{x^2-9}-\frac{4x}{x^2+5x+6}$? $\frac{5x}{(x+3)(x-3)}-\frac{4x}{(x+3)(x+2)}$

$\frac{5x(x+2)}{(x+3)(x-3)(x+2)}-\frac{4x(x-3)}{(x+3)(x-3)(x+2)}=\frac{5x^2+10x-4x^2+12x}{(x+3)(x-3)(x+2)}$

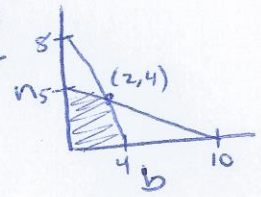
A. $\frac{7x}{(x-3)(x+3)(x+2)}$ C. $\frac{x^2-2x}{(x-3)(x+3)(x+2)}$

(B.) $\frac{x^2+22x}{(x-3)(x+3)(x+2)}$ D. $\frac{9x^2-2x}{(x-3)(x+3)(x+2)}$

A-CED.3

1. Jill bakes banana bread and nut bread for a bake sale.
   - Banana bread uses 2 eggs and a half a pound of flour
   - Nut bread uses 1 egg and 1 pound of flour
   - Jill has 8 eggs and 5 pounds of sugar to use
   - She makes a profit of $3 for each loaf of banana bread and $2 for each loaf of nut bread.

   $2b+1n\leq 8$ eggs
   $\frac{1}{2}b+1n\leq 5$ flour



   How many loaves of banana bread should Jill make to maximize her profit?

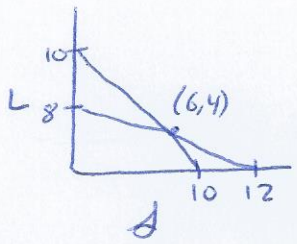
   $b^{\$3}$ $n^{\$2}$
   $(4,0)=\$12$
   $(2,4)=\$14$
   $(0,5)=\$10$

   A. 0 (B.) 2 C. 4 D. 5

2. Phil and Cathy make and sell boomerangs for a school event to raise money for charity.
   - They make two sizes small and large.
   - The small boomerangs take 2 hours to carve and the large one takes 3 hours to carve.
   - They have a total of 24 hours available for carving and they only have time to decorate 10 boomerangs of either size.
   - The small boomerang will make $8 for charity and the large boomerang will make $10 for charity.

   $2s+3L\leq 24$
   $s+L\leq 10$

   How many large boomerangs should they make to maximize their profit?



   A. 0 (B.) 4 C. 8 D. 10

   $s^{\$8}$ $L^{\$10}$
   $(10,0)=\$80$
   $(0,8)=\$80$
   $(6,4)=\$88$

A-REI.2

1. Solve $\frac{5}{2x-2} = \frac{15}{x^2-1}$ $2(x+1)(x-1)$ $5(x+1) = 30$ $5x+5=30$ $x=5$

   A. $x = 1$ B. $x = 5$ C. $x = 1, 5$ D. no solution

2. Solve $\frac{y}{5} + \frac{y}{2} = 7$ 10 $2y+5y=70$ $7y=70$ $x=10$

   A. $x = 2$ B. $x = 5$ C. $x = 7$ D. $x = 10$

3. Solve $\frac{x}{x-5} + \frac{3}{x+2} = \frac{7x}{(x-5)(x+2)}$ $(x-5)(x+2)$ $x(x+2)+3(x-5)=7x$ $x^2+2x+3x-15=7x$ $x^2-2x-15=0$ Ext. $x = 5, -3$

   A. $x = -3$ B. $x = 5$ C. $x = -3, 5$ D. no solution

4. Solve $\sqrt{x-3} + 5 = x$ $-5 \quad -5$ $\sqrt{x-3} = x-5$ $x-3 = (x-5)^2$ $x-3 = x^2-10x+25$ $0 = x^2-11x+28$ $x = 7, 4$ Ext

   A. $x = 4$ B. $x = 7$ C. $x = 4, 7$ D. no solution

5. Solve $\sqrt{3x+7}^2 = x-1^2$ $3x+7 = (x-1)^2$ $3x+7 = x^2-2x+1$ $0 = x^2-5x-6$ $x = 6, -1$ Ext

   A. $x = -1$ B. $x = 6$ C. $x = -1, 6$ D. no solution

6. After an accident, police can determine how fast a car was traveling before the driver put on his brakes by using the equation $s = \sqrt{30fd}$. s represents the speed in miles per hour, f represents the coefficient of friction, and d represents the length of the skid in feet. Suppose the coefficient of friction is 0.6, if you were driving 35 miles per hour, how many feet would it take for you to stop?

   A. 30 feet B. 47 feet C. 68 feet D. 81 feet

$s = \sqrt{30fd}$

$35 = \sqrt{30(.6)d}$

$1225 = 30(.6)d$

$1225 = 18d$

$d = 68.05$

A-REI.4b

1. Solve $5x^2 - 180 = 0$

   A. $x = -6$ B. $x = 6$ C. $x = \pm 6$ D. No real solution

   $5x^2 = 180$
   $x^2 = 36$
   $x = \pm 6$

2. What are the solutions of $-4x^2 - 72 = 0$?

   A. $\pm 2i\sqrt{3}$ B. $\pm 3i\sqrt{2}$ C. $\pm 2\sqrt{3}$ D. $\pm 3\sqrt{2}$

   $-4x^2 = 72$
   $x^2 = -18$
   $x = \pm\sqrt{-18} = \pm 3i\sqrt{2}$

3. What are the values of x that satisfy the equation $3 - 27x^2 = 0$?

   A. $x = \pm 3$ C. $x = \pm\frac{1}{3}$

   B. $x = \pm\frac{1}{9}$ D. $x = \pm 2\sqrt{6}$

   $-3 \quad -3$
   $\frac{-27x^2}{-27} = \frac{-3}{-27}$
   $x^2 = \frac{3}{27} = \frac{1}{9}$

   $\sqrt{x^2} = \pm\sqrt{\frac{1}{9}}$
   $x = \pm\frac{1}{3}$

4. What are the solutions of $x^2 + 10x + 40 = 5$?

   A. $10 \pm i\sqrt{5}$ C. $5 \pm i\sqrt{10}$

   B. $-10 \pm i\sqrt{5}$ D. $-5 \pm i\sqrt{10}$

   $x^2 + 10x + 35 = 0$
   $\frac{-10 \pm \sqrt{10^2 - 4(1)(35)}}{2}$ $\frac{-10 \pm \sqrt{-40}}{2} = \frac{-10 \pm 2i\sqrt{10}}{2}$
   $= -5 \pm i\sqrt{10}$

5. Which equation has $-3 \pm 5i$ as its solutions?

   A. $x^2 + 6x = -34$ C. $x^2 + 6x = -14$

   B. $x^2 + 3x = 4$ D. $x^2 + 3x = 2$

   $x^2 + 6x + 34$
   $\frac{-6 \pm \sqrt{6^2 - 4(1)(34)}}{2} = \frac{-6 \pm 10i}{2}$
   $= -3 \pm 5i$

A.REI.11

1. For what values of x does $f(x) = g(x)$ if $f(x) = x^3 + 3x^2$ and $g(x) = x + 3$?

   A. $-3, -1, 1$ B. $-3, 1, 3$ C. $-1, 1, 3$ D. $-3, -1, 3$

2. For what values of x does $f(x) = g(x)$ if $f(x) = |2x - 1| + 5$ and $g(x) = -\frac{1}{2}x + 9$?

   A. $-2, 10$ B. $-2, 8$ C. $-2, 2$ D. $8, 10$

3. For what values of x does $f(x) = g(x)$ if $f(x) = 2^x$ and $g(x) = \frac{3}{2}x + 1$?

   A. $2, 4$ B. $0, 1$ C. $4, 1$ D. $2, 0$

F-IF.4

1. During which interval is the graph of $f(x) = -\frac{1}{2}x^2 + 3x - 2.5$ positive?

   A. $1 < x < 5$ C. $x < 1$ and $x > 5$

   B. $1 \leq x \leq 5$ D. $x \leq 1$ and $x \geq 5$

2. During which of following intervals is the graph of $f(x) = 3x^3 + 10x^2 - x - 12 = 0$ positive?

   A. $x > 0$ B. $x > 1$ C. $-3 < x < -1$ D. $-2 < x < 0$

3. During which of the following intervals is the graph of $f(x) = x^3 + x^2 - 6x$ negative?

   A. $x < -3$ B. $x < 0$ C. $-3 < x < 0$ D. $x > 2$

4. What is the y-intercept of $y = \sin(\theta + \frac{\pi}{2})$?

   A. $(0,0)$ B. $(0,1)$ C. $(\frac{\pi}{2},0)$ D. $(0,\frac{\pi}{2})$

5. During which of the following intervals is the graph of $y = \frac{1}{2}\cos\theta$ increasing?

   A. $0 < \theta < \frac{\pi}{2}$ C. $\frac{\pi}{2} < \theta < \pi$

   B. $\frac{\pi}{2} < \theta < \frac{3\pi}{2}$ D. $\pi < \theta < 2\pi$

6. Which function has a period of 4π and an amplitude of 8?

   A. $y = -8\sin 8\theta$ C. $y = -8\sin\frac{1}{2}\theta$

   B. $y = 8\sin 2\theta$ D. $y = 4\sin 8\theta$

7. Which of the following describes the end behavior of $2x^4 - 20x^2 + 18$?

   A. $x \to -\infty\ f(x) \to +\infty,\ x \to +\infty\ f(x) \to +\infty$

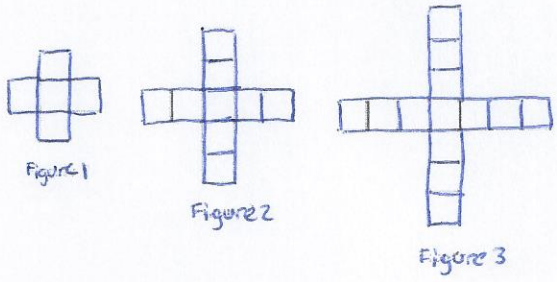
   B. $x \to -\infty\ f(x) \to +\infty,\ x \to +\infty\ f(x) \to -\infty$

   C. $x \to -\infty\ f(x) \to -\infty,\ x \to +\infty\ f(x) \to +\infty$

   D. $x \to -\infty\ f(x) \to -\infty,\ x \to +\infty\ f(x) \to -\infty$

F-BF.2

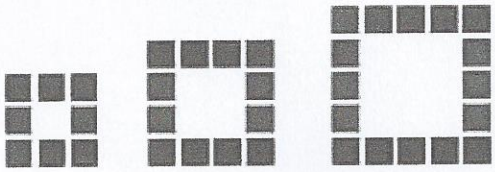
1. From the pattern below,



Which of the following explicit formulas represents the pattern?

A. $a_n = 4n + 1$ B. $a_n = n + 4$ C. $a_n = 4n$ D. $a_n = 4n + 4$

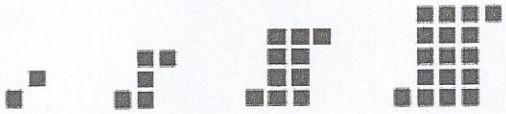
2. From the pattern below,



Which of the following explicit formulas represent the pattern?

A. $a_n = 4n$
B. $a_n = 4n - 4$
C. $a_n = 4n + 2$
D. $a_n = 4n + 4$

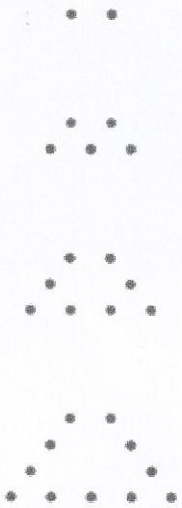
3. From the pattern below,



Which of the following explicit formulas represent the pattern?

A. $a_n = n^2 - 1$
B. $a_n = 2n - 1$
C. $a_n = n^2 + 1$
D. $a_n = 2n - 1$

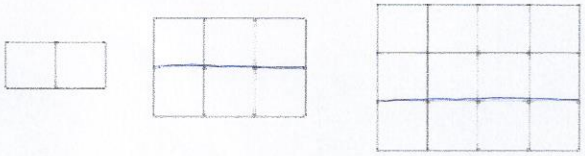
4. For the pattern below,



Which of the following recursive formulas could be used to determine the next term?

A. $a_n = 3 \cdot a_{n-1}$
B. $a_n = a_{n-1} - 3$
C. $a_n = a_{n-1} + 3$
D. $a_n = 3 \cdot a_{n-1} - 3$

5. For the pattern below,



Which of the following explicit formulas could be used to determine the next term?

A. $a_n = n^2 + 1$
B. $a_n = n(n+1)$
C. $a_n = 2n + n$
D. $a_n = n(n-1)$

6. A man swims 1.5 miles on Monday, 1.6 miles on Tuesday, 1.8 miles on Wednesday, and 2.1 miles on Thursday. If the pattern continues, how many miles will the man swim on Saturday?

A. 2.5 miles
B. 3.0 miles
C. 3.5 miles
D. 4.2 miles

F-BF.3

1. The graph $f(x) = 3^x$ is translated 2 units to the right and down 6 units resulting in $g(x)$. Which of the following functions represents $g(x)$?

   A. $g(x) = 3^{(x-2)} - 6$ C. $g(x) = 3^{(x-6)} - 2$

   B. $g(x) = 3^{(x+2)} - 6$ D. $g(x) = 3^{(x+6)} - 2$

2. The function $f(x) = 3(2)^x$ models the growth of a bacteria culture. What is the change that occurs to the graph if $f(x + k)$ is graphed and $k < 0$?

   A. The graph moves up k units

   B. The graph moves down k units

   C. The graph moves left k units

   D. The graph moves right k units

3. Which function is a phase shift of $y = \sin\theta$ by 5 units to the left?

   A. $y = 5\sin\theta$ B. $y = \sin\theta + 5$ C. $y = \sin(\theta + 5)$ D. $y = \sin 5\theta$

4. Which function is a translation of $y = \cos\theta$ by 5 units down?

   A. $y = -5\cos\theta$ B. $y = \cos(-5\theta)$ C. $y = \cos(\theta - 5)$ D. $y = \cos\theta - 5$

5. Which function is a translation of $y = \sin\theta$ that is $\frac{\pi}{3}$ units up and $\frac{\pi}{2}$ units to the left?

   A. $y = \sin(\theta + \frac{\pi}{3}) + \frac{\pi}{2}$ C. $y = \sin\left(\theta + \frac{\pi}{2}\right) + \frac{\pi}{3}$

   B. $y = \sin\left(\theta - \frac{\pi}{2}\right) + \frac{\pi}{3}$ D. $y = \sin\left(\theta - \frac{\pi}{3}\right) - \frac{\pi}{2}$

F-BF.4

1. What is the inverse of $y = 5x - 1$?

   A. $y = 5x + 1$ B. $y = \frac{x+1}{5}$ C. $y = \frac{x}{5} + 1$ D. $y = \frac{x}{5} - 1$

   $x = 5y - 1$

   $\frac{x+1}{5} = \frac{5y}{5}$

2. What is the inverse of $y = x^2 - 3$?

   A. $y = \pm\sqrt{x} + 3$ B. $y = \pm\sqrt{x} - 3$ C. $y = \pm\sqrt{x+3}$ D. $y = \pm\sqrt{x-3}$

   $x = y^2 - 3$

   $\sqrt{x+3} = \sqrt{y^2}$

   $y = \pm\sqrt{x+3}$

3. Find the inverse of $f(x) = \sqrt{2x-1} + 3$

A. $f^{-1}(x) = \frac{x^2-6x+10}{2}$

B. $f^{-1}(x) = \frac{x^2-6x+8}{2}$

C. $f^{-1}(x) = x^2 + 2$

D. $f^{-1}(x) = x^2 + 4$

$x = \sqrt{2y-1} + 3$

$(x-3)^2 = \sqrt{2y-1}^2$

$x^2 - 6x + 9 = 2y - 1$

$+1 \quad +1$

$\frac{x^2-6x+10}{2} = \frac{2y}{2}$

4. Find the inverse of $f(x) = \frac{1}{5}x^3$

A. $f^{-1}(x) = \sqrt{5x}$

B. $f^{-1}(x) = 3x^5$

C. $f^{-1}(x) = \sqrt[3]{5x}$

D. $f^{-1}(x) = \frac{1}{3}x^5$

$x = \frac{1}{5}y^3$

$\sqrt[3]{5x} = \sqrt[3]{y^3}$ $\quad y = \sqrt[3]{5x}$

F-LE.4

1. Solve for x: $2e^{5x} = 34$

A. $x = \frac{\ln(34)}{5}$

B. $x = \frac{\ln(17)}{5}$

C. $x = \frac{\ln(17)}{2}$

D. $x = \frac{\ln(64)}{5}$

$2e^{5x} = 34$

$e^{5x} = 17$

$\ln \quad \ln$

$\frac{5x}{5} = \frac{\ln(17)}{5}$

2. Solve for x: $4(2)^{3x} = 172$

A. $x = \frac{\log_2 688}{3}$

B. $x = \frac{\log_2 43}{3}$

C. $x = \frac{\log_3 43}{2}$

D. $x = \frac{\log_3 688}{2}$

$4(2)^{3x} = 172$

$\log_2 2^{3x} = 43$ $\quad \log_2$

$\frac{3x}{3} = \frac{\log_2 43}{3}$

3. Solve for x: $3(10)^{2x} = 60$

A. $x = \frac{\log 20}{2}$

B. $x = \frac{\log 20}{3}$

C. $x = \frac{\log 60}{2}$

D. $x = \log 10$

$3(10)^{2x} = 60$

$\log \quad 10^{2x} = 20$ $\quad \log$

$\frac{2x}{2} = \frac{\log 20}{2}$

4. Sally opened a savings account that earns 8% interest compounded continuously in order to save money for a $4500 car. So far Sally has saved $2500. How many years did it take for Sally to save enough money to buy the car if she did not add any more money to the account?

A. $x = \frac{\ln\left(\frac{9}{5}\right)}{.08}$

B. $x = \log_{1.08}\left(\frac{9}{5}\right)$

C. $x = \frac{.08}{\ln\left(\frac{9}{5}\right)}$

D. $x = \log_{\frac{9}{5}} 1.08$

$2500e^{.08x} = 4500$

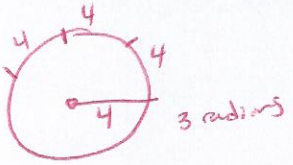
$\ln \quad e^{.08x} = \frac{9}{5} \quad \ln$

$\frac{.08x}{.08} = \frac{\ln\left(\frac{9}{5}\right)}{.08}$

F-TF.1

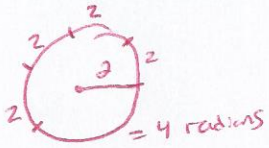
1. The diameter of a circle is 8 meters. A central angle of the circle intercepts an arc of 12 meters. What is the radian measure of the angle?

   A. $\frac{3}{2}$ B. 2 C. 3 D. 4



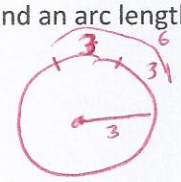
2. The radius of a circle is 2 centimeters. A central angle of the circle intercepts an arc of 8 centimeters. What is the radian measure of the angle?

   A. 2 B. 3 C. 4 D. 8



3. A circle has a central angle whose radian measure is 2 and an arc length of 6 meters. What is the diameter of the circle in inches?

   A. 2 B. 3 C. 6 D. 12



4. In a circle, an arc of length 8π is intercepted by a central angle of $\frac{2\pi}{3}$ radians. What is the radius of the circle?

   A. $\frac{3\pi}{16}$ cm B. $\frac{16\pi}{3}$ cm C. $\frac{16\pi^2}{3}$ cm D. 12 cm

$\frac{8\pi}{\frac{2\pi}{3}} = 8\pi \cdot \frac{3}{2\pi} = 12$

F-TF.2

1. William put the tip of his pencil on the outer edge of a graph of the unit circle at the point (0, -1). He moved this pencil tip through an angle of $\frac{4\pi}{3}$ radians in the counterclockwise direction along the edge of the circle. At what angle of the unit circle did William's pencil tip stop?

   A. $\frac{\pi}{3}$ B. $\frac{5\pi}{6}$ C. $\frac{7\pi}{6}$ D. $\frac{5\pi}{3}$

$\frac{4\pi}{3}$ radians $= 240^\circ$

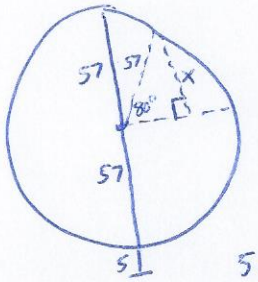
2. Max put the tip of his pencil on the outer edge of a graph of the unit circle at the point (-1, 0). He moved his pencil tip through an angle of $\frac{\pi}{6}$ radians in the counterclockwise direction along the edge of the circle. At what angle of the unit circle did Max's pencil tip stop in radians?

   A. $\frac{7\pi}{6}$ B. $\frac{\pi}{6}$ C. $\frac{5\pi}{6}$ D. $\frac{11\pi}{6}$

$\frac{\pi}{6} = 30^\circ$

3. A Ferris wheel has a diameter of 114 feet and is 5 feet off the ground. After a person gets on the bottom car, the Ferris wheel rotates 170^0 counterclockwise before stopping. How high above the ground is the car when it has stopped?

A. 56 feet B. 62 feet C. 80 feet (D.) 118 feet



$\sin(80) = \frac{x}{57}$

$x = \sin(80) \cdot 57$

$x = 56.13$

$56.13 + 57 + 5$

$= 118.13$

F-TF.8

1. Which expression is equivalent to $\sin\theta \cos\theta \csc\theta$?

A. $\sin\theta$ (B.) $\cos\theta$ C. $\sec\theta$ D. $\tan\theta$

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

2. Which expression is equivalent to $\cos\theta + \tan\theta \sin\theta$?

(A.) $\sec\theta$ B. $\tan\theta$ C. $\sin\theta$ D. $\cos\theta$

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

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

3. Which expression is equivalent to $\frac{\cos\theta}{1-\sin\theta} - \tan\theta$?

(A.) $\sec\theta$ B. $\sin\theta$ C. $\cos\theta$ D. $\csc\theta$

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

$= \frac{\cos^2\theta + \sin^2\theta - \sin\theta}{\cos\theta(1-\sin\theta)}$

4. Which expression is equivalent to $\tan\theta \cot\theta - \cos^2\theta$?

A. $\cos^2\theta$ B. $\tan^2\theta$ (C.) $\sin^2\theta$ D. $\sec\theta$

$\frac{\sin\theta}{\cos\theta} \cdot \frac{\cos\theta}{\sin\theta} - \cos^2\theta$

$= 1 - \cos^2\theta$

$= \sin^2\theta$

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

$= \sec\theta$

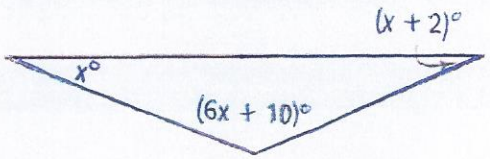
5. Which expression is equivalent to $\frac{1}{\sin^2\theta} - \frac{\cos^2\theta}{\sin^2\theta}$?

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

A. $\sin^2\theta$ B. $\cos^2\theta$ C. $\csc^2\theta$ (D.) 1

G-CO.10

1. Find the measure of each angle in the triangle below.



$x+x+2+6x+10=180$

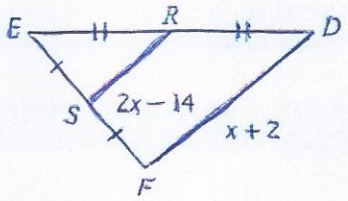
$8x+12=180$

$8x=168$

$x=21$

21, 23, 136

2. Find SR in the figure below



$2(2x-14)=x+2$

$4x-28=x+2$

$-x \quad -x$

$3x-28=2$

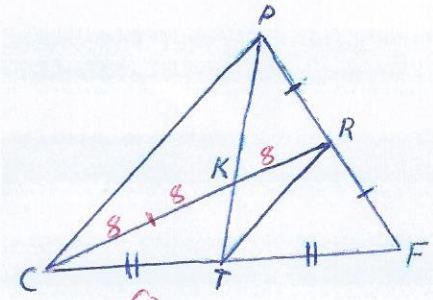
$3x=30$

$x=10$

$SR=2(10)-14$

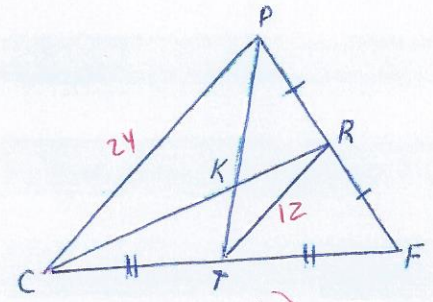
$=6$

3. If $CR = 24$, what is KR?



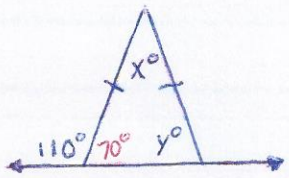
A. 6 (B.) 8 C. 12 D. 16

4. If $TR = 12$, what is CP?



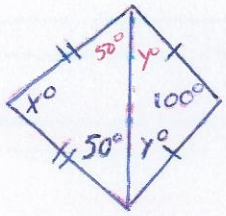
A. 16 B. 18 (C.) 24 D. 36

5. Solve for x and y



$x = 40^\circ$
$y = 70^\circ$

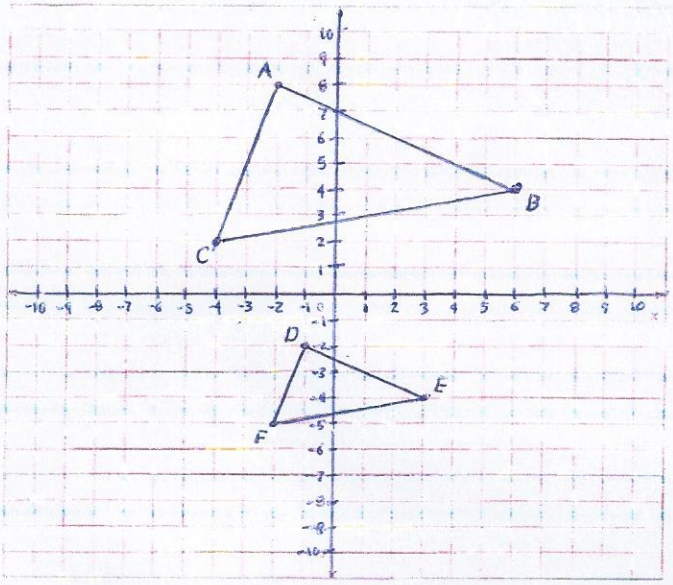
6. Solve for x and y



$x = 80^\circ$
$y = 40^\circ$

G-SRT.2

1. Determine if the triangles below are similar. If so write the similarity statement



$\overline{AB} = \sqrt{(4-8)^2+(6-2)^2} = \sqrt{80}$

$\overline{DE} = \sqrt{(-4-2)^2+(3-(-1))^2} = \sqrt{20}$

$\overline{AC} = \sqrt{(8-2)^2+(-2-4)^2} = \sqrt{40}$

$\overline{DF} = \sqrt{(-2-5)^2+(-1-2)^2} = \sqrt{10}$

$\overline{BC} = \sqrt{(4-2)^2+(6-4)^2} = \sqrt{104}$

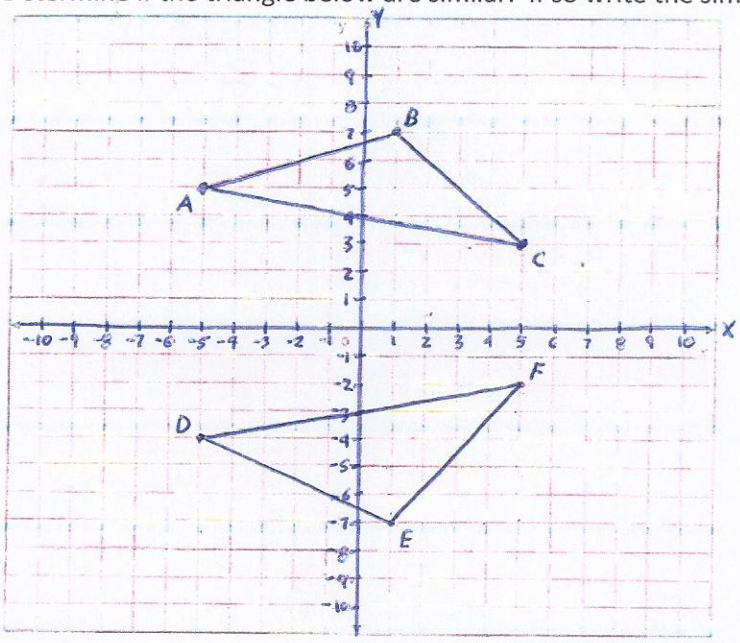
$\overline{EF} = \sqrt{(-4-5)^2+(3-2)^2} = \sqrt{26}$

$\frac{AB}{DE} \cong \frac{AC}{DF} \cong \frac{BC}{EF}$

$2 = 2 = 2$ ✓

So $\triangle ABC \sim \triangle DEF$

2. Determine if the triangle below are similar. If so write the similarity statement.



$\overline{AB} = \sqrt{(7-5)^2+(1-5)^2} = \sqrt{40}$

$\overline{DE} = \sqrt{(-7-4)^2+(1-5)^2} = \sqrt{45}$

$\overline{BC} = \sqrt{(5-1)^2+(3-7)^2} = \sqrt{32}$

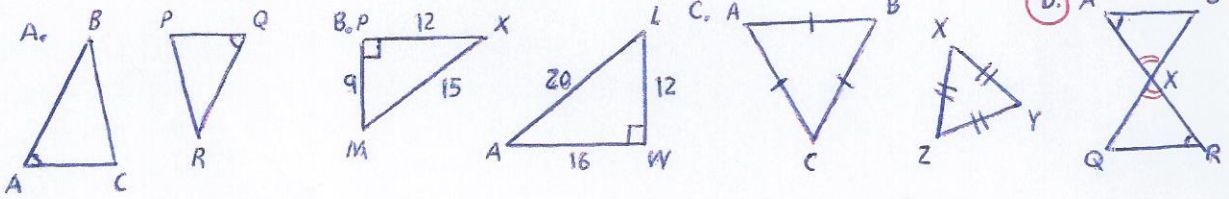
$\overline{EF} = \sqrt{(-7-2)^2+(1-5)^2} = \sqrt{41}$

$\overline{AC} = \sqrt{(5-5)^2+(3-5)^2} = \sqrt{104}$

$\overline{DF} = \sqrt{(5-5)^2+(-2-4)^2} = \sqrt{104}$

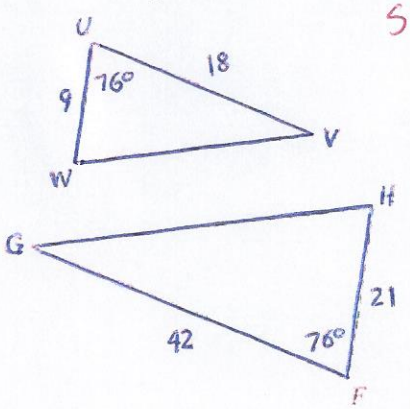
not similar

3. Which pair of triangles can be proven by the $AA\sim$ Postulate?



4. Are the triangles below similar?

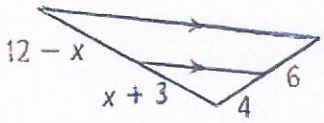
SAS



$\frac{9}{21} = \frac{18}{42} = \frac{3}{7}$

G-SRT.4

1. Find x



$\frac{12-x}{6} = \frac{x+3}{4}$

$6x+18 = 48-4x$

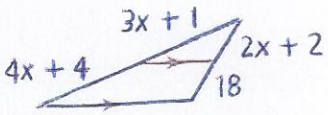
$+4x \quad +4x$

$10x+18 = 48$

$10x = 30$

$x = 3$

2. Find x



$\frac{3x+1}{2x+2} = \frac{4x+4}{18}$

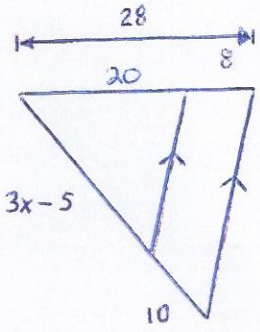
$54x+18 = 8x^2+16x+8$

$-54x \quad -18 \qquad -54x \quad -18$

$0 = 8x^2 - 38x - 10$

$x = 5$

3. Solve for x



$\frac{3x-5}{20} = \frac{10}{8}$

$200 = 24x - 40$

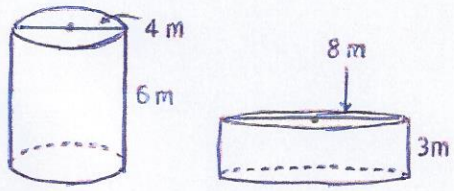
$240 = 24x$

$x = 10$

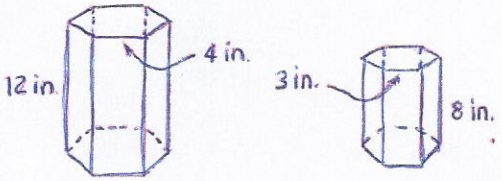
G-SRT.5

1. Which of the figures shown below are similar?

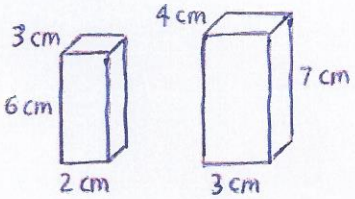
(A)



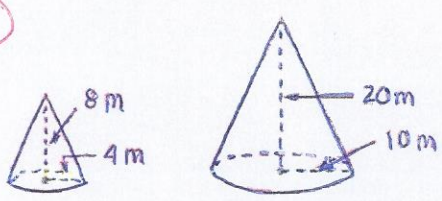
(B)



(C)



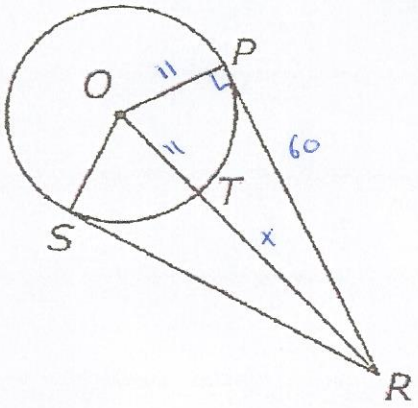
(D)



$\frac{8}{4} = \frac{20}{10}$

G-C.2

1. In the figure below, $\overline{PR}$ and $\overline{SR}$ are tangent to circle O



$11^2 + 60^2 = (x+11)^2$

$3721 = x^2 + 22x + 121$

$0 = x^2 + 22x - 3600$

$(x-50)(x+72)$

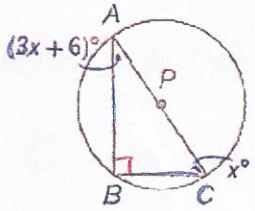
$x = 50, -72$

$OR = 50 + 11 = 61$

If $OT = 11\ cm$ and $PR = 60\ cm$, what is the length of $\overline{OR}$?

(A.) 61 cm B. 59 cm C. 50 cm D. 48 cm

2. Find $m < A$



$3x + 6 + x = 90$

$4x + 6 = 90$

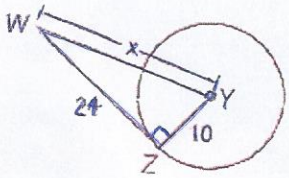
$4x = 84$

$x = 21$

$\angle A = 3x + 6$

$= 69$

3. Find x if WZ lies tangent to circle y

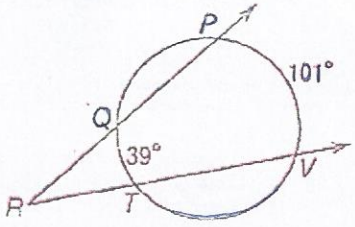


$10^2 + 24^2 = x^2$

$676 = x^2$

$x = 26$

4. Find $m < R$

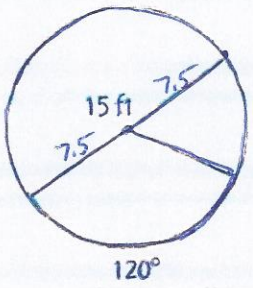


$\angle R = \frac{1}{2}(101 - 39)$

$= 31$

G-C.5

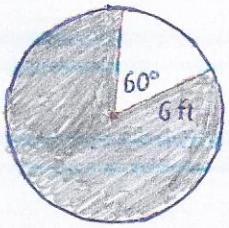
1. Find the arc length given the arc degree



$\frac{120}{360} \cdot 2\pi(7.5)$

$= 15.71$

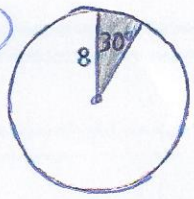
2. Find the area of the shaded region



$\frac{300}{360} \cdot \pi(6)^2 = 94.25$

3. Which sector below has the greatest area?

A.



$\frac{30}{360} \cdot \pi(8)^2$

$= 16.76$

B.

$\frac{60}{360} \cdot \pi(5)^2$

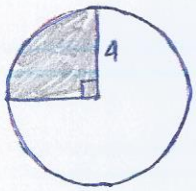
$= 13.09$

C.

$\frac{45}{360} \cdot \pi(6)^2$

$= 14.14$

D.



$\frac{90}{360} \cdot \pi(4)^2$

$= 12.57$

G-GPE.1

Write each of the following circle equation in standard form and state the center and radius.

1. $x^2 + y^2 + 8x - 6y - 24 = 0$

$x^2 + 8x + \underline{16} + y^2 - 6y + \underline{9} = 24 + 16 + 9$

$(x+4)^2 + (y-3)^2 = 49$

center $(-4, 3)$ $r = 7$

2. $x^2 + y^2 - 10x - 2y = -11$

$x^2-10x+25+y^2-2y+1=-11+25+1$

$(x-5)^2+(y-1)^2=15$

center $(5,1)$ $r=\sqrt{15}$

3. $x^2 + y^2 + 8y + 16 = 10$

$x^2+y^2+8y+16=-6+16$

$x^2+(y+4)^2=10$ center $(0,-4)$ $r=\sqrt{10}$

4. Which is the equation of a circle with center (-2, 3) and a radius r = 5?

A. $(x + 2)^2 + (y - 3)^2 = 10$

B. $(x + 2)^2 + (y - 3)^2 = 25$

C. $(x - 2)^2 + (y + 3)^2 = 10$

D. $(x - 2)^2 + (y + 3)^2 = 25$

G-GPE.2

1. Find the equation of a parabola with a focus (3, -5) and a directrix of y = 1

vertex $(3,-2)$

$y=-\frac{1}{12}(x-3)^2-2$ $-2+\frac{1}{4a}=-5$ $a=-\frac{1}{12}$

$\frac{1}{4a}=-3$

2. Find the equation of a parabola with a focus (-3, -1) and directrix of y = 3

$y=-\frac{1}{8}(x+3)^2+1$ vertex $(-3,1)$ $1+\frac{1}{4a}=-1$ $a=-\frac{1}{8}$

$\frac{1}{4a}=-2$

3. Find the equation of a parabola with a vertex (0, 3) and a focus (-8, 3)

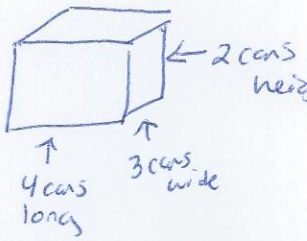
$x=-\frac{1}{32}(y-3)^2+0$ $0+\frac{1}{4a}=-8$

$\frac{1}{4a}=-8$

$a=-\frac{1}{32}$

G-MG.3

1. A shipping company is designing boxes to meet specific requirements.
   - Each box must be a completely closed rectangular prism with no overlapping material.
   - The boxes must hold 24 cans in two layers of 12 cans each.
   - The cans are 3 inches in diameter and 5 inches in height.



What is the smallest amount of cardboard needed to meet the specifications?

A 1,080 in.2
B 840 in.2
C 636 in.2
D 540 in.2

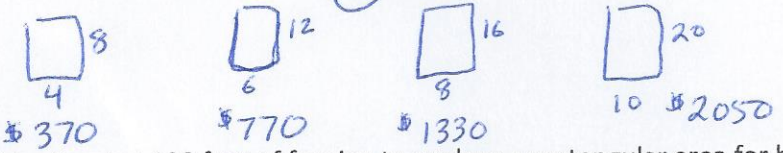
$2(12\cdot9)+2(9\cdot10)+2(12\cdot10)$
$=636\ in^2$

$L=12in$ $W=9in$ $H=10in$

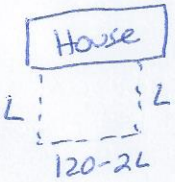
2. The cost of a newspaper advertisement is a function of its size.
   - A company wants its advertisement to have a height that is twice its width
   - The newspaper charges a flat rate of $50 plus an additional $10 per square inch
   - The company can spend no more than $1330 on the advertisement.

What is the maximum height of an advertisement that the company can afford?

A. 8 inches B. 12 inches (C.) 16 inches D. 20 inches



3. Adrian is using 120 feet of fencing to enclose a rectangular area for her puppy. If one side of the enclosure will be her house, what is the greatest area it can create?



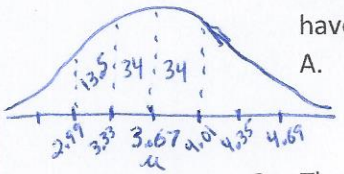
$A=L(120-2L)$

$\max(30, 1800)$

Length 30

S-ID.4

1. A town has 685 households. The number of people per household is normally distributed with a mean, μ, of 3.67 and a standard deviation, σ, of 0.34. ***Approximately*** how many households have between 2.99 and 4.01 people?



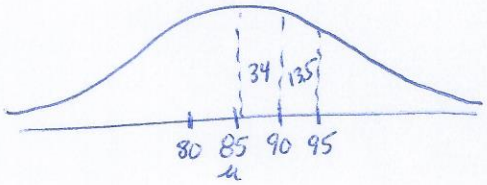
A. 493 households B. 520 households (C.) 558 households D. 575 households

81.5%

$.815(685)=558.275$

2. The scores of an exam are normally distributed, with a mean, μ, of 85 and a standard deviation, σ, of 5. What percent of the scores are from 85 to 95?

A. 13.5% B. 34% (C.) 47.5% D. 68%



47.5%

3. A data set has a mean of 36 and a standard deviation of 3. What data value would have a *z*-score of -2?

(A.) 30 B. 33 C. 34 D. 35

$-2 = \frac{X-36}{3}$

$X = 30$

14

4. A data set has a mean of 45 and a standard deviation of 4. What is the *z*-score of the data value of 55?

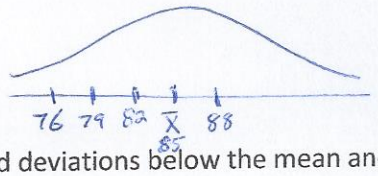
A. 1.5 B. 2 (C.) 2.5 D. 3

$\frac{55-45}{4} = 2.5$

S-IC.4

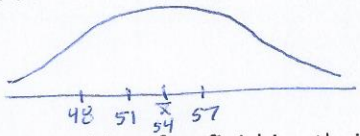
1. In a set of test scores that are normally distributed, a test score of 76 is 3 standard deviations below the mean. A score of 88 is 1 standard deviation above the mean. What is the mean of the data?

A. 79 B. 82 C. 84 (D.) 85



2. In a set of data that is normally distributed, 48 is 2 two standard deviations below the mean and a score of 57 is 1 standard deviation above the mean. What is the mean of the data?

A. 51 (B.) 54 C. 56 D. 60



3. Of 400 teenagers surveyed, 62% do not plan to stay in their communities after finishing their education. Find the margin of error for the sample.

A. ±2% B. ±4% (C.) ±5% D. ±6%

margin of error $= \pm \frac{1}{\sqrt{400}}$

$= .05$ or 5%

4. Of 800 teenagers polled, 59% think boys and girls are portrayed as equals on television. Find the interval likely to contain the true population proportion.

(A.) 55.5% to 62.5% C. 57% to 61%

B. 57.5% to 60.5% D. 58% to 60%

$= \pm \frac{1}{\sqrt{800}} = .035$ or 3.5%

-3.5 ← 59% → +3.5

55.5% 62.5%