

Name: _____

Date: _____

Algebra 2 - Mixed Review #6

Period: _____

Show all work.

Which of the following represents the recursive form for the explicit formula $a_n = 9n + 17$?

- (1) $a_1 = 9; a_n = a_{n-1} + 17$
 - (2) $a_1 = 9; a_n = 9a_{n-1}$
 - (3) $a_1 = 26; a_n = a_{n-1} + 9$
 - (4) $a_1 = 26; a_n = a_{n-1} + 17$
- $9(1) + 17 = 26$
 $9(2) + 17 = 35$

34% of homes in NYS own a fireplace and 18% of homes in NYS own a patio. What percent of homes own both a fireplace and patio?

- (1) 0.16
 - (2) 0.06
 - (3) 0.53
 - (4) 0.24
- $.34(.18)$

To the nearest tenth, the value of x that satisfies $2^x = -3x + 6$.

- (1) 1.1
- (2) 1.2
- (3) 1.3
- (4) 1.4

The function $f(x)$ is defined by $f(x) = \frac{2}{3}x + 6$.

Determine $f^{-1}(x)$.

- (1) $y = \frac{3}{2}x - 9$
 - (2) $y = \frac{2}{3}x + 4$
 - (3) $y = \frac{3}{2}x - 18$
 - (4) $y = \frac{2}{3}x - 12$
- $y = \frac{2}{3}x + 6$
 $x = \frac{3}{2}y + 6$
 $x - 6 = \frac{3}{2}y$

The water level in a draining reservoir is changing such that the depth of water decreases by 12.5% per hour. If the water starts at a depth of 800 feet, then which of the following functions properly models the depth, d , as a function of time, t , in hours since it started draining?

- (1) $d = 800(0.125)^t$
- (2) $d = 800(0.875)^t$
- (3) $d = 800(12.5)^t$
- (4) $d = 800(88.5)^t$

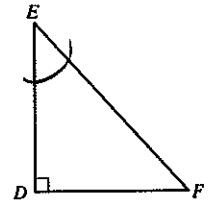
Which of the following has a period of 2?

- (1) $y = -\cos(x)$
- (2) $y = \sin 2x$
- (3) $y = -\cos 2\pi x$
- (4) $y = \sin \pi x$

$\frac{2\pi}{2} = \pi$

Which expression is equivalent to $\sec E$?

- (1) $\frac{DE}{EF}$
- (2) $\frac{EF}{DE}$
- (3) $\frac{DF}{EF}$
- (4) $\frac{EF}{DF}$



$\cos = \frac{DE}{EF} \rightarrow \frac{EF}{DE}$

Which ordered pair is a solution of the system $x + y = 5$ and $(x + 3)^2 + (y - 3)^2 = 53$?

- (1) (2,3)
- (2) (5,0)
- (3) (-5,10)
- (4) (-4,9)

An angle P , terminates in Quadrant II if

- (1) $\cos P < 0$ and $\csc P < 0$
- (2) $\sin P > 0$ and $\cos P > 0$
- (3) $\csc P > 0$ and $\cot P < 0$
- (4) $\tan P < 0$ and $\sec P > 0$



Part 2.

1. Factor completely: $(6x^3 - 5x^2y - 24xy^2 + 20y^3)$

$$x^2(6x-5y) - 4y^2(6x-5y)$$

$$(x^2 - 4y^2)(6x-5y)$$

$$(x+2y)(x-2y)(6x-5y)$$

2. Determine the solution set to the equation $2x^2 - x = -1$.

$$2x^2 - x + 1 = 0$$

$$\frac{1 \pm \sqrt{(-1)^2 - 4(2)(1)}}{2(2)}$$

$$\frac{1 \pm \sqrt{-7}}{4}$$

$$\boxed{\frac{1}{4} \pm \frac{i\sqrt{7}}{4}}$$

3. Determine the sum and product of the roots of the equation $4x^2 = 7x + 3$.

$$4x^2 - 7x - 3 = 0$$

$$\boxed{S = \frac{7}{4}} \quad \boxed{P = -\frac{3}{4}}$$

4. Determine the sum of the first 50 terms of the sequence defined by 16, 22, 28, ...

$$a_{50} = 16 + (50-1)(6) = 310 \quad +6 +6$$

$$S_{50} = \frac{50(16 + 310)}{2} = \boxed{8150}$$

5. The number of bacteria present in a petri dish can be modeled by the equation $N = 40e^{2t}$ where N is the number of bacteria present in the dish after t hours. Using this model, determine, to the nearest hundredth, the number of hours it will take for N to reach 25,000.

$$25,000 = 40e^{2t}$$

$$\ln 625 = e^{2t}$$

$$\frac{\ln 625}{2} = t$$

$$3.218875825$$

$$\boxed{3.22}$$

6. Convert 3 radians and express to the nearest minute.

$$3^r = 171.8873385$$

$$\boxed{171^\circ 53'}$$

7. Describe how a controlled experiment can be created to examine the effect of Nutrient A on the growth of a fish.

randomly create 2 groups
one group gets A one does not

Part 3 and 4 Questions.

8. The scores of one class on the Unit 2 mathematics test are shown in the table below.

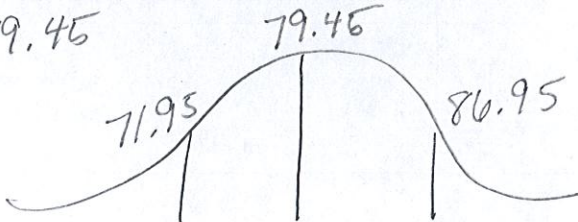
Find the standard deviation of these scores, to the nearest tenth.

Test Score	Frequency
96	1
92	2
84	5
80	3
76	6
72	3
68	2

$$s_x = 7.538645026 \quad \boxed{7.5}$$

How many students scored within one standard deviation of the mean?

$$\bar{x} = 79.45$$



$$5 + 3 + 6 + 3 = 17$$

9. The given table shows the amount of water vapor, y , that will saturate 1 cubic meter of air at different temperatures, x .

Write an exponential regression equation for this set of data, rounding all values to the nearest thousandth.

Amount of Water Vapor That Will Saturate 1 Cubic Meter of Air at Different Temperatures

Air Temperature (x) ($^{\circ}\text{C}$)	Water Vapor (y) (g)
-20	1
-10	2
0	5
10	9
20	17
30	29
40	50

$$y = a \cdot b^x$$

$$a = 4.193833373$$

$$b = 1.067571263$$

$$\boxed{y = 4.194(1.068)^x}$$

Using this equation, predict the amount of water vapor that will saturate 1 cubic meter of air at a temperature of 50° , and round your answer to the nearest tenth of a gram.

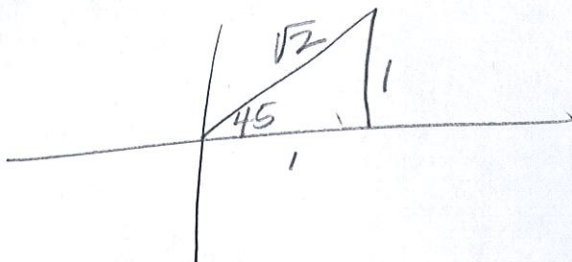
$$y = 4.194(1.068)^{50}$$

$$y = 112.5099834$$

$$\boxed{y = 112.5}$$

10. Find the exact value of $\csc \frac{\pi}{4}$.

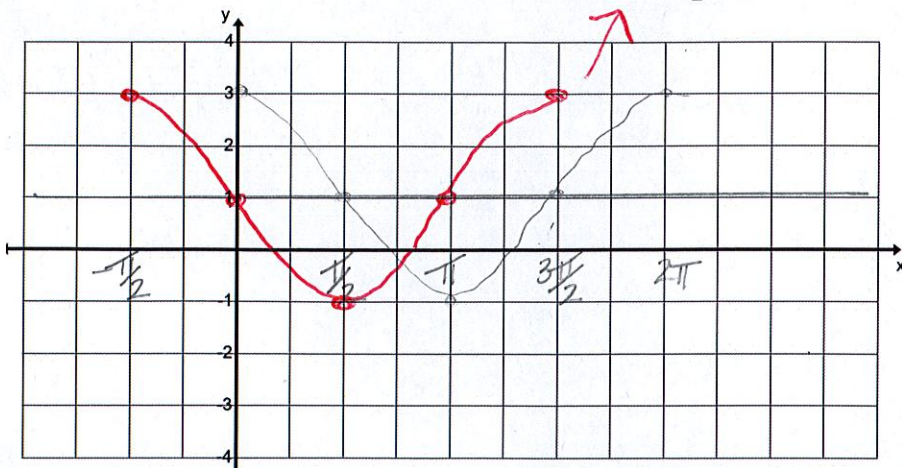
$$\frac{\pi}{4} \cdot \frac{180}{\pi} = 45^{\circ}$$



$$\sin = \frac{1}{\sqrt{2}}$$

$$\boxed{\csc = \sqrt{2}}$$

11. Graph one cycle of the equation: $y = 2\cos(x + \frac{\pi}{2}) + 1$



12. The ocean tides on the east coast follow a repeating pattern over time, with the amount of time between each low and high tide remaining relatively constant. On a certain day, low tide occurred at 8 am and high tide occurred at 12 noon. At high tide, the water level was 4 inches above the average local sea level; at low tide it was 4 inches below the average local sea level. Assume the high tide and low tide are the maximum and minimum water levels each day, respectively.

a. Write a cosine function of the form $y = A\cos(B(x - C)) + D$, where A and B are real numbers, that models the water level, in inches above or below the average each coast sea level, as a function of the time measured in x hours since 8 am.

$$a = 4$$

$$p = 8$$

$$\frac{2\pi}{b} = 8$$

$$\frac{2\pi}{8} = \frac{8b}{8} \quad \frac{\pi}{4}$$

$$y = -4\cos\left(\frac{\pi}{4}x\right)$$

b. On the grid, graph one cycle of this function.

