

Name: \_\_\_\_\_

Date: \_\_\_\_\_

Algebra 2 - Mixed Review HW #5

Period: \_\_\_\_\_

Multiple Choice. Show all work.

The expression  $(\sqrt[3]{b})^5 (\frac{1}{b^2})$  can be written as  $b^a$

Determine the value of a.

- (1) -1/3
- (2) -3
- (3) 1/3
- (4) 3

$$b^{5/3} \cdot b^{-2}$$

A city is tracking reports of identity theft. During the first 4 weeks of their study, they find the following number of reports: 11, 22, 44, and 88. Which is a possible explicit rule for the number of reports in the  $n$ th week?

- (1)  $a_n = 11(2)^n$
- (3)  $a_n = 2(11)^n$

- (2)  $a_n = 11(2)^{n-1}$
- (4)  $a_n = 2(11)^{n-1}$

Which expression is equivalent to  $3 \sum_{n=3}^5 (4a+n)$ ?

- (1)  $36a + 36$
- (2)  $12a + 36$
- (3)  $36a + 12$
- (4)  $12a + 15$

$$4a+3$$

$$4a+4$$

$$4a+5$$


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$$3(12a+12)$$

Express in simplest radical form  $\sqrt[3]{256x^{14}y^9}$ .

- (1)  $8x^4y^3\sqrt[3]{4x^2}$
- (2)  $4x^4y^3\sqrt[3]{4x^2}$
- (3)  $8x^7y^4\sqrt[3]{4y}$
- (4)  $4x^4y^3\sqrt[3]{4x^2}$

$$\sqrt[3]{64x^{12}y^9} = \sqrt[3]{4x^2}$$

$$4x^4y^3 \sqrt[3]{4x^2}$$

Which expression shows the value of a \$2500 investment after it has grown by 4.5% per year for 12 years?

- (1)  $2500(1.045)^{144}$
- (2)  $2500(1.45)^{12}$
- (3)  $2500(1.045)^{12}$
- (4)  $2500(1.45)^{12}$

Determine the solution set for in simplest form.

$$(x^2 + 3x + 17)^{1/3} = 81^{3/4}$$

- (1)  $\{-5, 2\}$
- (2)  $\{-2, 5\}$
- (3)  $\{-5\}$
- (4)  $\{-2\}$

$$x^2 + 3x + 17 = 27$$

$$x^2 + 3x - 10 = 0$$

$$(x+5)(x-2) = 0$$

A survey was conducted on the number of hours high school students slept during the school week. The mean, median, and standard deviation were 27, 28.5, and 2.5. Which interval represents 95% of the results from the survey?

- (1)  $27 \pm 2.5$
- (3)  $27 \pm 5$

- (2)  $28.5 \pm 2.5$
- (4)  $28.5 \pm 5$

$$27 \pm 5$$

Expand using the appropriate log properties

$$\log \frac{x^2}{2y}$$

$$2 \log x - (\log 2 + \log y)$$

- (1)  $\log x^2 - \log 2y$
- (2)  $2 \log x - \log 2y$
- (3)  $2 \log x - \log 2 + \log y$
- (4)  $2 \log x - \log 2 - \log y$

If the function  $y = \frac{9}{2x^3}$  was placed in the form

$y = ax^b$ , where a and b are real numbers,

which is the value of a + b?

- (1) 3/2
- (2) -6
- (3) 15
- (4) -4/3

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

The probability of taking Fright Fiction is 0.23 and the probability of taking Drama is 0.15. Determine the probability of taking Fright Fiction or Drama.

- (1) 0.38
- (3) 0.0345
- (2) 0.35
- (4) 0.65

Determine which of the following is not true for an angle measuring  $150^\circ$ ?

- (1)  $\cos 150 = -\sqrt{3}/2$
- (2) reference angle =  $30^\circ$ .
- (3) equivalent to  $6\pi/5$ .
- (4) coterminal with  $510^\circ$ .

A sin curve has a period of 14. Determine the Frequency.

- (1) 7
- (2)  $\pi/14$
- (3)  $7\pi$
- (4)  $\pi/7$

$$\frac{2\pi}{14}$$

The point  $(\sqrt{15}, -7)$  is not found on the unit circle. Find the value of  $\csc \theta$ .

- (1)  $-8/7$
- (2)
- (3)
- (4)

$$80 \left( \frac{\pi}{180} \right)$$

An  $80^\circ$  central angle of a circle with a radius of 12 cm intercepts an arc on the circle. Determine the Measure of this arc.

- (1)  $16\pi/3$
- (2) 960
- (3) 6.7
- (4)  $\pi/27$

$$S = \theta r$$

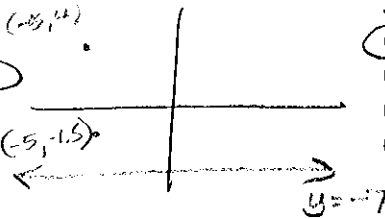
$$= \frac{4\pi}{9} (12)$$

The function  $f(x)$  has a turning point of  $(-2, -3)$ . Which of the following transformations of  $f(x)$  does not result in the stated turning point?

- (1)  $g(x) = 2f(2x)$ ; turning point =  $(-1, -6)$
- (2)  $h(x) = 1/2f(x+4)$ ; turning point =  $(2, -3/2)$
- (3)  $j(x) = f(x-5) + 1$ ; turning point =  $(3, -2)$
- (4)  $k(x) = f(1/2x)$ ; turning point  $(-4, -3)$

The focus of a parabola is located at  $(-5, 4)$  and the directrix has the equation  $y = -7$ . Determine the equation of this parabola.

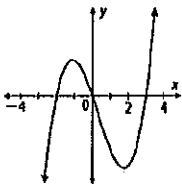
- (1)  $y = 1/44(x+5)^2 - 1.5$
- (2)  $y = 1/22(x+5)^2 - 1.5$
- (3)  $y = 1/44(x-5)^2 + 5.5$
- (4)  $y = 1/22(x-5)^2 - 5.5$



$$p = 5.5$$

Part 2. Show all work.

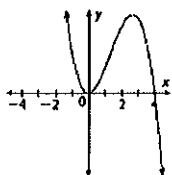
1. State the end behavior for the polynomial function shown.



$$x \rightarrow \infty \quad f(x) \rightarrow \infty$$

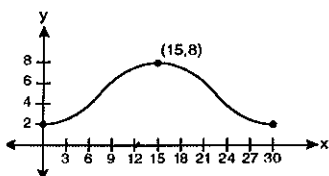
$$x \rightarrow -\infty \quad f(x) \rightarrow -\infty$$

2. State the equation of the polynomial function in factored form.



$$f(x) = x^2(x-4)$$

3. State the equation of the curve shown below.



$$p = 30$$

$$b = \frac{2\pi}{30} = \frac{\pi}{15}$$

$$m = 5$$

$$a = 3$$

$$y = -3\cos\left(\frac{\pi}{15}x\right) + 5$$

4. Prove the identity:

$$\begin{aligned} x^3 + y^3 &= (x+y)(x^2 - xy + y^2) \\ &= x(x^2 - xy + y^2) + y(x^2 - xy + y^2) \\ &= x^3 - x^2y + xy^2 + x^2y - xy^2 + y^3 \end{aligned}$$

$$x^3 + y^3 = x^3 + y^3$$

5. Chris believes  $x + 2$  is a factor of the expression  $x^3 - 4x^2 + x - 6$ . Is he correct? Explain your answer.

$$\begin{aligned} (-2)^3 - 4(-2)^2 - 2 - 6 & \quad \text{no, remainder} \\ -8 - 8 - 2 - 6 = -32 & \quad \text{is not } 0 \end{aligned}$$

6. Water is draining from a tank maintained by the Fairport Fire Department. Students measured the depth of water at 15-second intervals and recorded the results in the table. Write a power regression equation for this set of data rounding all values to the nearest thousandth.

Time (x) in sec.	15	30	45	60	75
Depth of Water (y) in ft.	11.8	9.9	8.2	6.3	5.9

$$y = 42.233(x)^{-.449}$$

$$\begin{aligned} y &= ax^b \\ a &= 42.23261902 \\ b &= -.44935166777 \end{aligned}$$

7. A survey was taken to examine the relationship between hair color and eye color. The chart below shows the proportion of the people surveyed who fell into each category.

		Hair Color			Total
		Black	Blond	Red	
Eye Color	Blue	0.15	0.20	0.05	0.40
	Brown	0.25	0.10	0.00	0.35
	Green	0.05	0.05	0.15	0.25
	Total	0.45	0.35	0.20	1.00

Is having red hair independent of having green eyes? Show all work.

$$\begin{aligned} P(R) &= .20 & (.2)(.25) &= .15 \\ P(G) &= .25 & .05 &\neq .15 \\ P(\text{Both}) &= .15 & & \text{no} \end{aligned}$$

8. Suppose  $P(A) = 0.30$  and  $P(B) = 0.40$ . If  $P(A|B) = 0.45$ , what is the probability of  $P(B|A)$ ?

$$\begin{aligned} P(A|B) &= \frac{P(A \cap B)}{P(B)} \\ .45 &= \frac{x}{.4} \end{aligned}$$

$$\begin{aligned} P(B|A) &= \frac{P(B \cap A)}{P(A)} \\ &= \frac{.18}{.3} \end{aligned}$$

$$P(A \cap B) = .18$$

$$.6$$

Part 3. Show all work.

9. Consider the function  $h(x) = |x - 1| - 8$  defined over the domain  $-4 \leq x \leq 7$ .

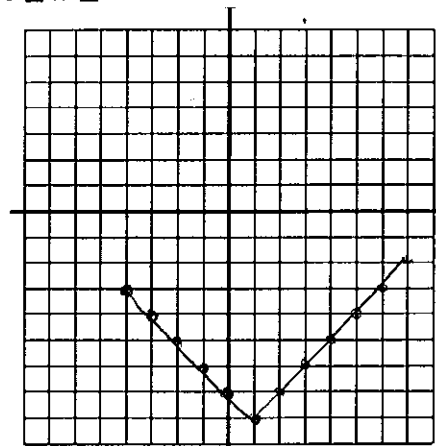
Sketch the graph.

State the x-intercepts. none over this interval

State the y-intercepts.  $(0, -7)$

State the range.  $[-8, -3]$

Evaluate  $h(4)$ .  $-5$



10. Determine the solution to the system of equations algebraically:

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

$$x - y = 3$$

$$y = x - 3$$

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

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

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

$$2x(x - 2) = 0$$

$$x = 0 \quad | \quad x = 2$$

$$(0, -3)$$

$$(2, -1)$$

11. Determine the solution set to the system:

$$a + 5b - c = -20$$

$$4a - 5b + 4c = 19$$

$$-a - 5b - 5c = 2$$

$$a + 5b - c = -20$$

$$-a - 5b - 5c = 2$$

$$-6c = -18$$

$$c = 3$$

$$5a + 3(3) = -1$$

$$5a = -10$$

$$a = -2$$

$$-2 + 5b - 3 = -20$$

$$-5 + 5b = -20$$

$$5b = -15$$

$$b = -3$$

$$a + 5b - c = -20$$

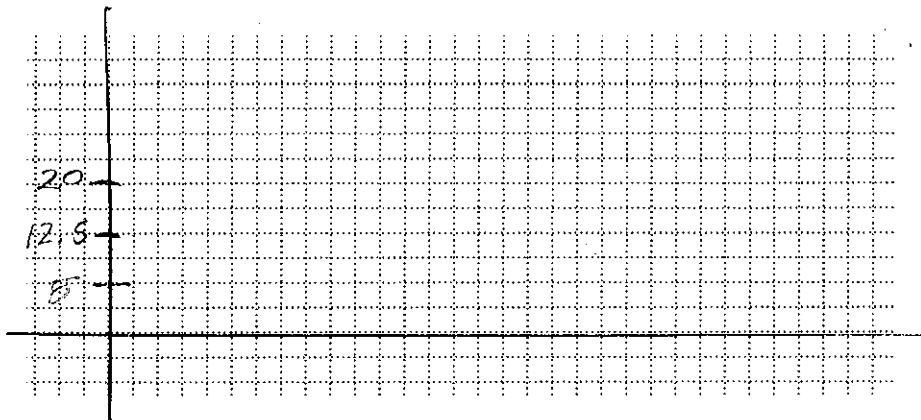
$$4a - 5b + 4c = 19$$

$$5a + 3c = -1$$

Part 4. Show all work.

12. At Disney World, there is a roller coaster that is a continuous series of identical hills that are 15m high from the ground. The platform to get on the ride is on top of the first hill. It takes 4 seconds for the coaster to reach the bottom of the hill 5m off the ground. Write a cosine function of the form  $f(t) = A\cos(Bt) + C$ , where  $A$ ,  $B$ , and  $C$  are real numbers that model the height of the roller coaster,  $f(t)$ , in meters, as a function of the time measured in  $t$  seconds.

Graph one cycle.



13. Determine all solutions to the equation:

$$x^4 - x^3 - 15x^2 - 63x - 162 = 0$$

*(6, 0)*

$$\begin{array}{r}
 x^3 + 5x^2 + 15x + 27 \\
 x - 6 \overline{) x^4 - x^3 - 15x^2 - 63x - 162} \\
 \underline{-x^4 + 6x^3} \phantom{- 15x^2 - 63x - 162} \\
 5x^3 - 15x^2 \phantom{- 63x - 162} \\
 \underline{-5x^3 + 30x^2} \phantom{- 63x - 162} \\
 15x^2 - 63x \phantom{- 162} \\
 \underline{-15x^2 + 90x} \phantom{- 162} \\
 27x - 162 \\
 \underline{-27x + 162} \\
 0
 \end{array}$$

$$\begin{array}{r}
 x^2 + 2x + 9 \\
 x + 3 \overline{) x^3 + 5x^2 + 15x + 27} \\
 \underline{-x^3 + 3x^2} \phantom{+ 15x + 27} \\
 2x^2 + 15x \phantom{+ 27} \\
 \underline{-2x^2 + 6x} \phantom{+ 27} \\
 9x + 27 \\
 \underline{-9x + 27} \\
 0
 \end{array}$$

$$-2 \pm \sqrt{2^2 - 4(1)(9)}$$

$$2$$

$$2 \pm \sqrt{-32}$$

$$2$$

$$2 \pm 4i\sqrt{2}$$

$$2$$

$$\boxed{-1 \pm 2i\sqrt{2}}$$

14. Solve algebraically for x:

$$\log_{x+3} \frac{x^3 + x - 2}{x} = 2$$

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

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

$$x^2 + 6x + 9 = \frac{x^3 + x - 2}{x}$$

$$\cancel{x^3} + 6x^2 + 9x = \cancel{x^3} + x - 2$$

$$6x^2 + 8x + 2 = 0$$

$$2(3x^2 + 4x + 1) = 0$$

$$2(3x + 1)(x + 1) = 0$$

$$\boxed{-\frac{1}{3}} \quad \boxed{-1}$$

15. Mrs. D owns a painting whose value has been growing exponentially. In the 6 years she's owned the painting, its value has grown from \$20,000 to \$30,000.

By about what percent did the painting's value grow each year?

$$30,000 = 20,000(1+r)^6$$

$$\sqrt[6]{1.5} = \sqrt[6]{(1+r)^6}$$

$$1.069913194 = 1+r$$

$$.0699131939$$

$$\boxed{7\%}$$

Using the rate found in the first part of this question, how many years, to the nearest hundredth of a year, will it take for the painting to be worth \$55,000?

$$55,000 = 20,000(1.07)^x$$

$$2.75 = 1.07^x$$

$$\frac{\log 2.75}{\log 1.07} = \frac{x \log 1.07}{\log 1.07}$$

$$14.95153886$$

$$\boxed{14.95}$$