Units 1 & 2 Review Quiz Name Solutions

1. Simplify the following.

a) $\sqrt{8}+\sqrt{12}-\sqrt{20}$

$= 2\sqrt{2} + 2\sqrt{3} - 2\sqrt{5}$

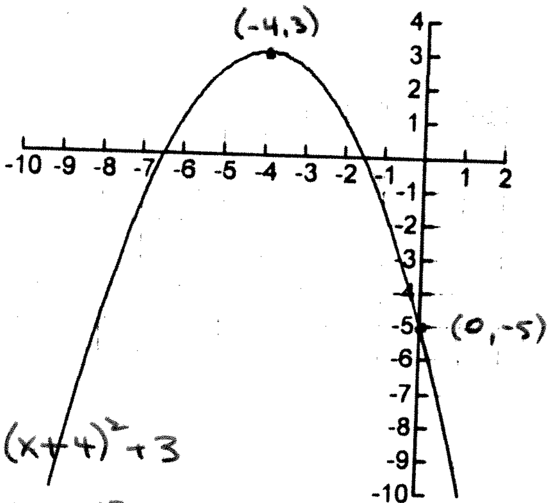
b) $\dfrac{16-\sqrt{20}}{6\sqrt{5}}$

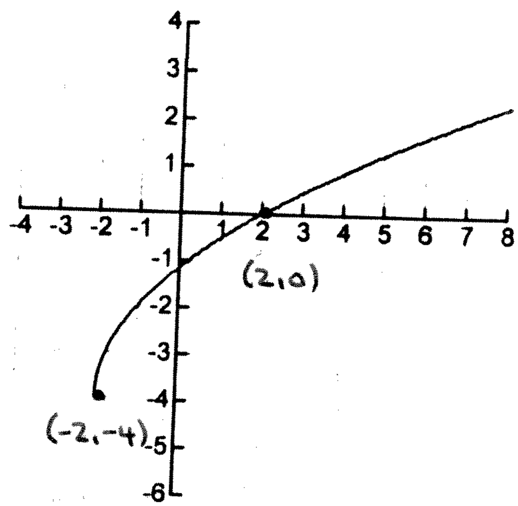
$= \dfrac{16-2\sqrt{5}}{6\sqrt{5}}$

$= \dfrac{2(8-\sqrt{5})}{{}_3\,6\sqrt{5}}$

$= \dfrac{8-\sqrt{5}}{3\sqrt{5}}$

2. Determine the equation that correctly identifies each graph.





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

$-5 = a(0+4)^2 + 3$

$-8 = 16a$

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

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

$y = a\sqrt{x+2} - 4$

$0 = a\sqrt{2+2} - 4$

$4 = a(\sqrt{4})$

$4 = 2a$

$2 = a$

$\therefore y = 2\sqrt{x+2} - 4$

3. For the equation $f(x) = -3x^2 - x + 2$:

a) Determine $f(-1)$.

$f(-1) = -3(-1)^2 - (-1) + 2$ $\rightarrow f(-1) = 0$

b) Determine the value of x when $f(x) = -8$.

$-8 = -3x^2 - x + 2$

$0 = -3x^2 - x + 10$ $\rightarrow 0 = -(3x-5)(x+2)$

$x = 5/3$, $x = -2$

4. State the Domain and Range for each of the following functions.

a) $y = -2\sqrt{3x+3} - .5$

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

$D = \{x \in \mathbb{R} \mid x \geq -1\}$

$R = \{y \in \mathbb{R} \mid y \leq -\frac{1}{2}\}$

b) $y = -\frac{1}{2}(x+3)^2 + 2$

$D = \{x \in \mathbb{R}\}$

$R = \{y \in \mathbb{R} \mid y \leq 2\}$

5. For the function $f(x) = \sqrt{(x-3)} + 1$, determine:

a) the Domain $D = \{x \in \mathbb{R} \mid x \geq 3\}$

b) the Range $R = \{y \in \mathbb{R} \mid y \geq 1\}$

c) the equation of its inverse

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

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

$(x-1)^2 + 3 = y, \; x \geq 1$

$\boxed{\therefore f^{-1}(x) = (x-1)^2 + 3}$

you must state this 'cause you only want 1 arm of the parabola'.

d) If its inverse is also a function, write the function using proper form. If not, explain why not.

6. For the graph below:

a) Describe all transformations to the graph of $y = \dfrac{1}{x}$

ht. right 2

vt down 3

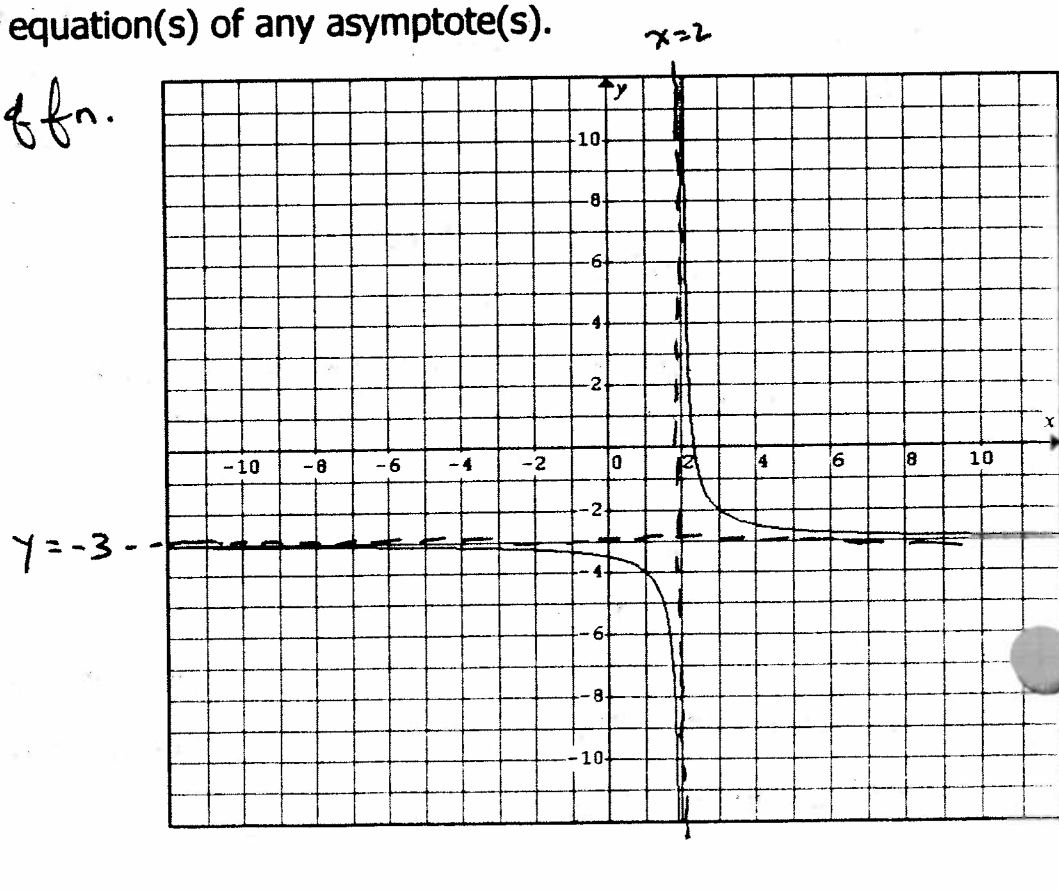
b) Determine the equation(s) of any asymptote(s).

$y = \dfrac{1}{x-2} - 3$ ← eqn. of fn.

Asymptotes:

$x = 2$

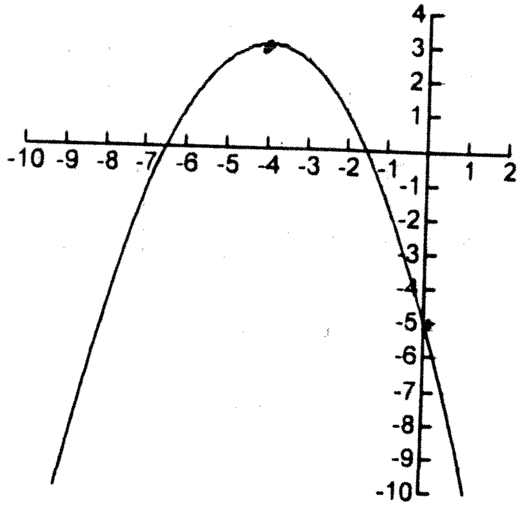
$y = -3$

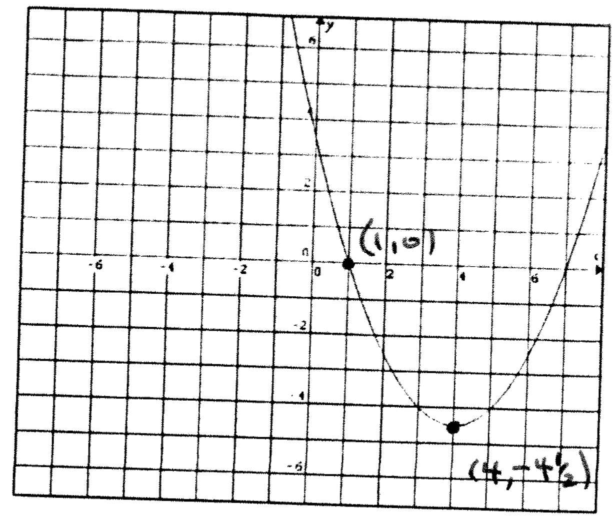


Name ______________________

Units 3 & 4 Review Quiz

1. a) Determine the equation that correctly identifies each graph.





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

$y = \frac{1}{2}(x-4)^2 - 4\frac{1}{2}$

b) The discriminant of both of the above must be $b^2 - 4ac > 0$.

2. Two numbers have a sum of 16. Determine the numbers if their product is a maximum.

Let x and y be the numbers

$x + y = 16$

$y = 16 - x$

$$\text{product} = x(16-x)$$
$$= -x^2 + 16x$$
$$= -(x^2 - 16x + 64) + 64$$
$$= -(x-8)^2 + 64$$

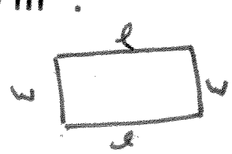
Max is 64 which occurs when $x = 8$

$\therefore$ #s are 8 and 8.

3. The perimeter of a rectangular yard is 480m. Determine the dimensions if the area is 14,000 m².

$P = 480$

$A = 14000$



$480 = 2l + 2w$

$480 - 2w = 2l$

$240 - w = l$

$A = l(w)$

$14000 = (240 - w)(w)$

$0 = -w^2 + 240w - 14000$

~~$w = \frac{-240 \pm \sqrt{240^2 - 4(-1)(-14000)}}{2(-1)}$~~

$0 = (w-100)(w-140)$

$w = 100$ or $w = 140$

$\therefore$ Dimensions are 100m × 140m.

4. A species of bacteria has a population of 3200 at 11:00 A.M. It triples every 8 hours. The function that models the growth of the population P at any time t, in hours,

is given by: $P(t) = 3200(3)^{\frac{t}{8}}$

a) Why is the exponent $\frac{t}{8}$? · Want to know how many tripling periods there are.

b) Why is the base 3? · Because the population is tripled

c) What does the 3200 relate to? original population

d) Determine the y-intercept of the function. 3200

e) Determine the population at 11:00 P.M. on the <u>following day</u>.

$t = 36$ $\quad P(36) = 3200(3)^{36/8}$

$= 448947.56$

∴ there are 448947 bacteria at 11pm.

f) At what time will the population reach 28800?

$28800 = 3200(3)^{t/8}$

$9 = 3^{t/8}$

$3^2 = 3^{t/8}$

$2 = t/8$

$t = 16$

∴ at 3pm the next day the population is 28800

5. The <u>half-life</u> of Tylenol is 6 hours. If I take 500 mg at 9:00 A.M., how much will be left in my system after 24 hours?

$P(t) = 500\left(\frac{1}{2}\right)^{t/6}$

$P(24) = 500\left(\frac{1}{2}\right)^{24/6}$

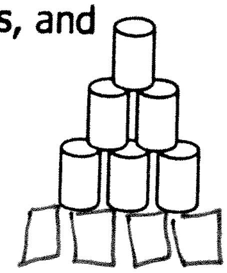
$= 31.25$

∴ 24hrs later there is 31.25 mg in your system.

Units 5 & 6 Review Quiz

Name ____________________

1. The 'Knock-Em-Over' carnival game requires participants to throw a ball at a pile of cans and attempt to knock over each can. At the 'Beginner Level', the cans are stacked 3 rows high, as shown:



At the 'Super-Advanced Level', the cans are piled 15 rows high!

a) Express the total number of cans required for 15 rows as a series, and evaluate.

$n = 15$
$a = 1$
$d = 1$

$$S_{15} = \frac{15}{2}[2(1) + (15-1)(1)]$$
$$= \frac{15}{2}(2+14)$$
$$= \frac{15}{2}(16)$$
$$= 120$$

As the level of difficulty increases, so does the number of points that a player can win. At the beginner level (Level 1) a player who wins gets 5 points. Level 2 is worth 10 points, Level 3 is worth 20 points, Level 4 is worth 40 points, etc.

b) Determine the number of points a player would win if successful at Level 10.

$a = 5$
$r = 2$
$n = 10$

$$t_{10} = 5(2)^{10-1}$$
$$= 5(2)^9$$
$$= 2560$$

$\therefore$ they would earn 2560 points

c) A player starts at Level 1 and completes all the way to Level 10. Express the total number of points earned as a series, and evaluate.

$a = 5$
$r = 2$
$n = 10$

$$S_{10} = \frac{5(2^{10}-1)}{2-1}$$
$$= 5115$$

$\therefore$ they would earn 5115 points

1
1 1
1 2 1
1 3 3 1
1 4 6 4 1
1 5 10 10 5 1

2. Expand and simplify each binomial power.

a) $(3y + 5)^5 = 1(3y)^5 + 5(3y)^4(5) + 10(3y)^3(5)^2 + 10(3y)^2(5)^3 + 5(3y)(5)^4 + 1(5)^5$

$= 243y^5 + 2025y^4 + 6750y^3 + 11250y^2 + 9375y + 3125$

b) $(2x - x^2)^4 = 1(2x)^4 + 4(2x)^3(-x^2) + 6(2x)^2(-x^2)^2 + 4(2x)(-x^2)^3 + 1(-x^2)^4$

$= 16x^4 - 32x^5 + 24x^6 - 8x^7 + x^8$

3. Adam borrows $18,000.00 to pay for a new car. He must repay the loan in monthly payments of $380.00 (at the end of each month), and interest is charged at 9%/annum, compounded monthly. Complete the amortization table.

	A	B	C	D	E
1	Payment Number	Payment	Interest Paid	Principal Paid	Outstanding Balance
2	0	---	---	---	$18,000.00
3	1	380.00			
4	2				
5	3				

What would his monthly payment be if he wanted to pay off the loan in 5 years?

PV = 18000

R = ?

$i = \frac{0.09}{12}$

$= 0.0075$

$n = 12(5)$

$= 60$

$18000 = \frac{R[1 - (1.0075)^{-60}]}{0.0075}$

$135 = R[1 - 1.0075^{-60}]$

$373.65 = R$

∴ his pmt would be $373.65

Units 7, 8 & 9 Review Quiz

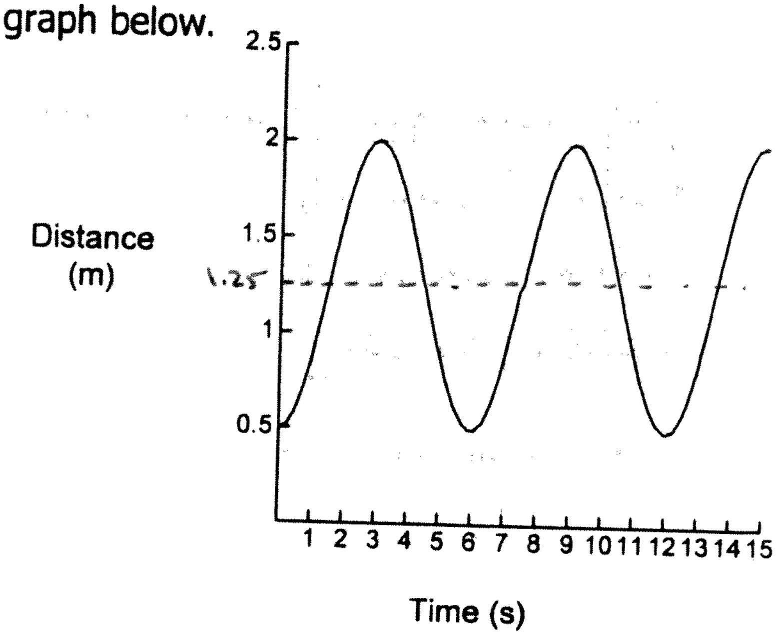
Name ______________________

1. Determine an equation for the graph below.

$a = 0.75$

$k = \frac{360}{6} = 60$

$D = -0.75\cos 60t + 1.25$



2. Point P (-15,-8) lies on the terminal arm of angle θ.

a) Sketch angle θ.

b) Determine:

-the primary trig ratios for angle θ

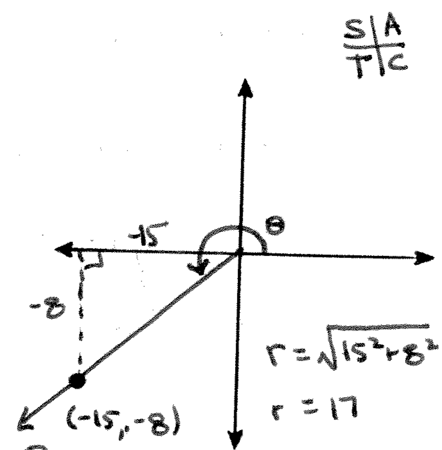
sin θ = $-8/17$

cos θ = $-15/17$

tan θ = $8/15$

-the related acute angle for angle θ $\sim 28°$

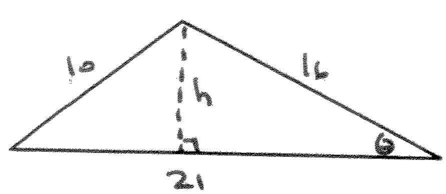
-angle θ in degrees $\sim 208°$



$\tan\beta = 8/15$

$\beta = 28.07°$

3. A triangle has side lengths of 10 cm, 16 cm, and 21 cm. Find its area.



Hint:

$$A = \frac{b \times h}{2}$$

① $\cos\theta = \frac{16^2 + 21^2 - 10^2}{2(16)(21)}$

$\cos\theta = 0.8883928571$

$\theta = 27.33°$

② $\sin\theta = \frac{h}{16}$

$16 \sin 27.33 = h$

$7.345... = h$

③ $A = \frac{21(7.345...)}{2}$

$A = 77.13$

∴ area is $77.13 cm^2$

4. Prove the following identities.

a) $(\sin x - \cos x)^2 = 1 - 2\sin x \cos x$

LS: $(\sin x - \cos x)^2$	RS: $1 - 2\sin x \cos x$
$= (\sin x - \cos x)(\sin x - \cos x)$	
$= \sin^2 x - 2\sin x\cos x + \cos^2 x$	
$= (\sin^2 x + \cos^2 x) - 2\sin x \cos x$	
$= 1 - 2\sin x \cos x$	

$\because$ LS = RS

$\therefore (\sin x - \cos x)^2 = 1 - 2\sin x \cos x$

b) $\cos^2 x + \dfrac{\sin x \cos x}{\tan x} = 2\cos^2 x$

LS: $\cos^2 x + \dfrac{\sin x \cos x}{\tan x}$	RS: $2\cos^2 x$
$= \cos^2 x + \sin x \cos x \left(\dfrac{\cos x}{\sin x}\right)$	
$= \cos^2 x + \cos^2 x$	
$= 2\cos^2 x$	

$\because$ LS = RS

$\therefore \cos^2 x + \dfrac{\sin x \cos x}{\tan x} = 2\cos^2 x$

$x \neq 0°, 180°, 360°$

5. For $y = -3\sin(2\theta - 60°)$, ~~determine the mapping formula and~~ graph one cycle of the function.

~~$(\theta, y) \rightarrow$~~

$y = -3\sin 2(\theta - 30°)$

amp. = 3

start: 30°

period = 180°

end: 210°

eoa: $y = 0$