Name ______________________________
Date ______________________________

Introduction to Technical Mathematics
Class #17 - Final Practice #2. www.wnyssis.com

Review Night #2

Section 1. Linear Graphing – 3 Techniques.

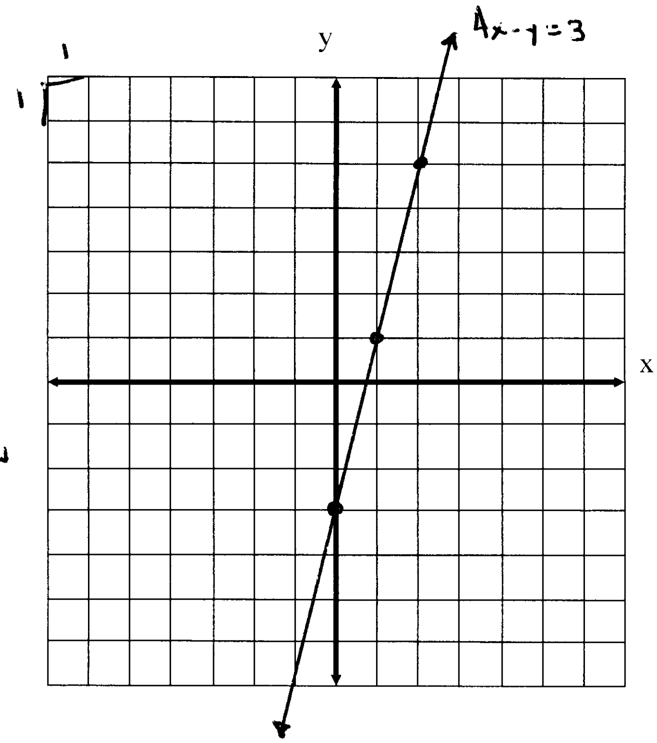
1. "Plug and Chug." Choose several (minimum of 3) x-values, and substitute to determine corresponding y-values. Be sure to show all arithmetic

a. $4x - y = 3$

x	y
1	1
2	5
3	9
0	-3

New Point: 0, -3

$4(1) - 1 = 3$
$4 - 1 = 3$
$3 = 3$
$4(2) - 5 = 3$
$8 - 5 = 3$
$4(3) - 9 = 3$
$12 - 9 = 3$ *Does Not Fit
$4(0) - (-3) = 3$
$0 + 3 = 3$
$3 = 3$ ✓



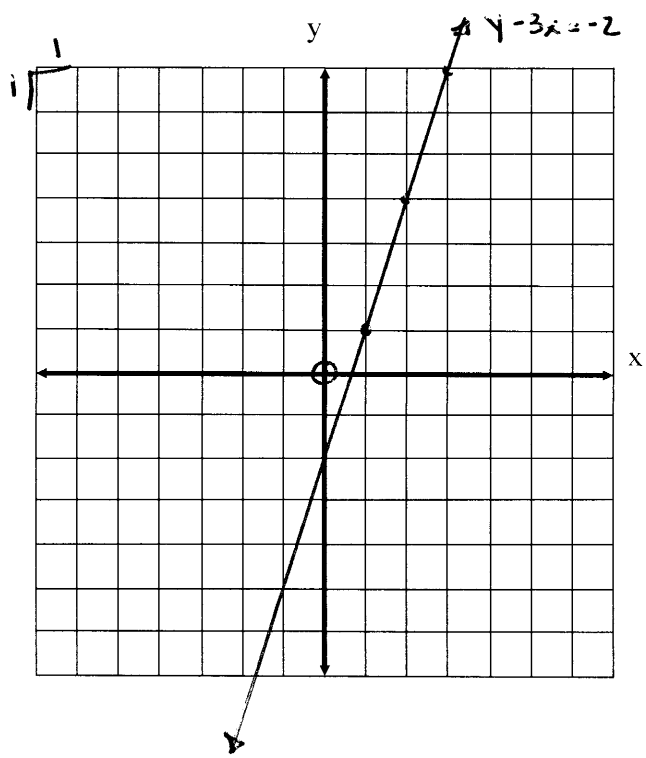
b. $y - 3x = -2$

x	y
1	1
2	4
3	1

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

$4 - 3(2) = -2$
$4 - 6 = -2$
$-2 = -2$

$7 - 3(3) = -2$
$7 - 9 = -2$
$-2 = -2$

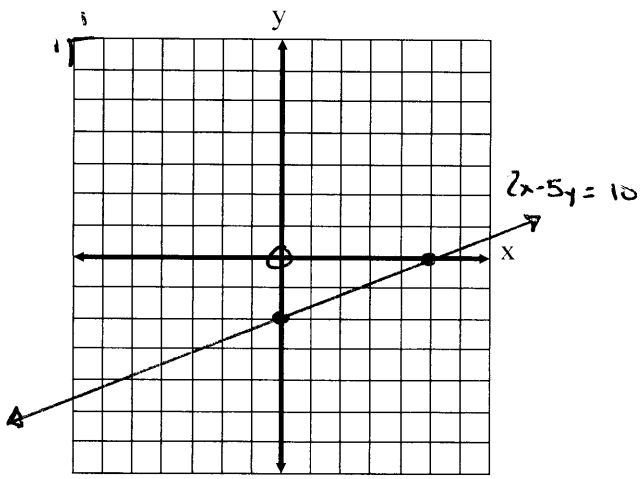


2. X and Y Intercepts. NOTE: After finding the x and y intercepts for the following graphs, please state the ACTUAL COORDINATES for the points themselves.

a. $2x - 5y = 10$

Work:

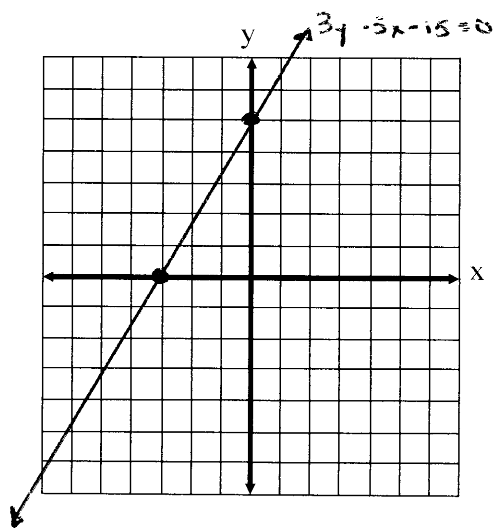
$x = 0$ | $y = 0$
$2(0) - 5y = 10$ | $2x - 5(0) = 10$
$-5y = 10$ | $2x = 10$
$y = -2$ | $x = 5$
@ $(0, -2)$ | @ $(5, 0)$



b. $3y - 5x - 15 = 0$

Work:

$x = 0$ | $y = 0$
$3y - 5(0) - 15 = 0$ | $3(0) - 5x - 15 = 0$
$3y - 15 = 0$ | $-5x - 15 = 0$
$+15 \quad +15$ | $+15 \quad +15$
$3y = 15$ | $-5x = 15$
$y = 5$ | $x = -3$
@ $(0, 5)$ | @ $(-3, 0)$



The Algebra of Intercepts: Find the coordinates for the intercepts:

State the x and y intercepts by their coordinates.

c. $f(x) = 3x + 2$

At $x = 0$
$f(x) = y$
$y = 3(0) + 2$
$y = 0 + 2$
$y = 2$

At $y = 0$
$f(x) = y$
$0 = 3x + 2$
$-2 \quad -2$
$-2 = 3x$
$-\frac{2}{3} = x$

c. $(0, 2)$ and $(-\frac{2}{3}, 0)$

d. $f(x) = 15 - 3x$

At $x = 0$
$y = 15 - 3(0)$
$y = 15$

At $y = 0$
$0 = 15 - 3x$
$+3x \quad +3x$
$3x = 15$
$x = 5$

d. $(0, 15)$ and $(5, 0)$

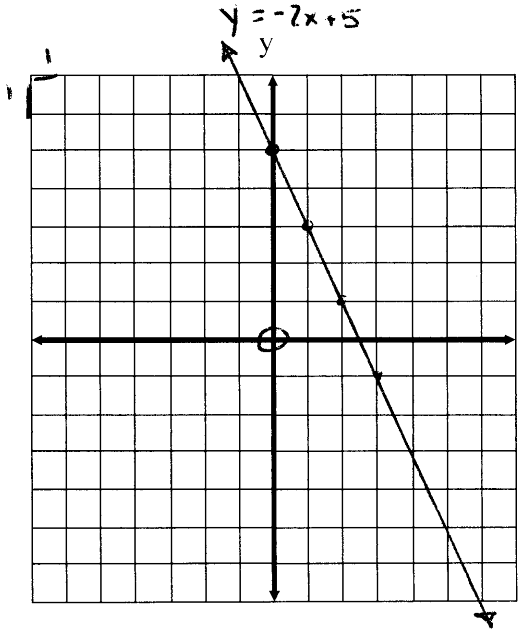
Graphing Lines by Slope-Intercept Method: $y = mx + b$.
Name at least 2 points on this line. State the slope and the y-intercept (coordinates).

3. $y = -2x + 5$

$m = -\frac{2}{1} = \frac{\Delta y}{\Delta x}$

$b = +5$

y-Intercept $(0,5)$



4. $3x + 2y = 6$

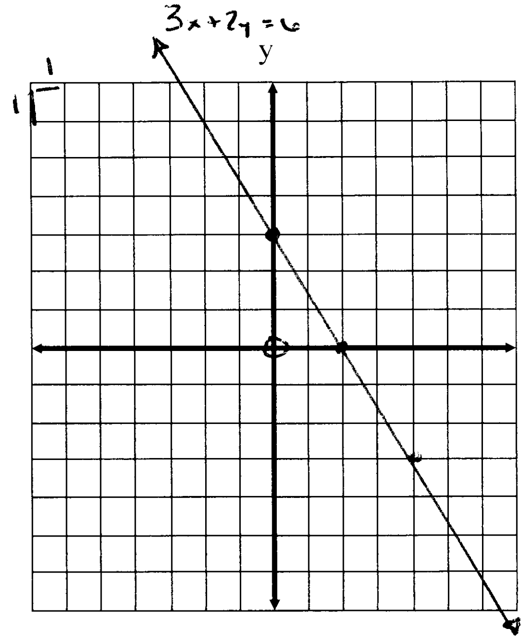
$\frac{2y}{2} = -\frac{3}{2}x + \frac{6}{2}$

$y = -\frac{3}{2}x + 3$

$m = -\frac{3}{2} = \frac{\Delta y}{\Delta x}$

$b = +3$

y-Int = $(0,3)$



5. $4x - 8y = 16$

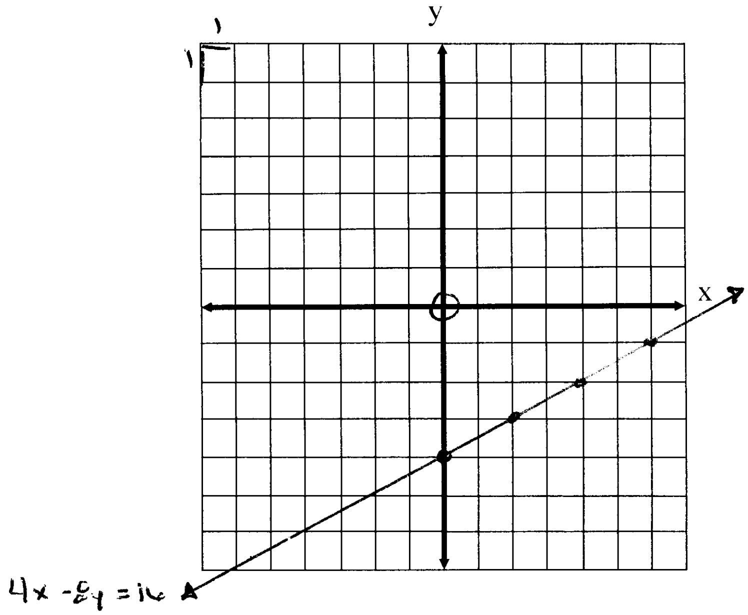
$\frac{-8y}{-8} = \frac{-4x}{-8} + \frac{16}{-8}$

$y = +\frac{1}{2}x - 4$

$m = \frac{1}{2} = \frac{\Delta y}{\Delta x}$

$b = -4$

y int = $(0,-4)$



Section 3. **Graphing the 2nd Degree (Parabola) Equation on the Coordinate Axes.**

1. $y = x^2 + 4x - 5$

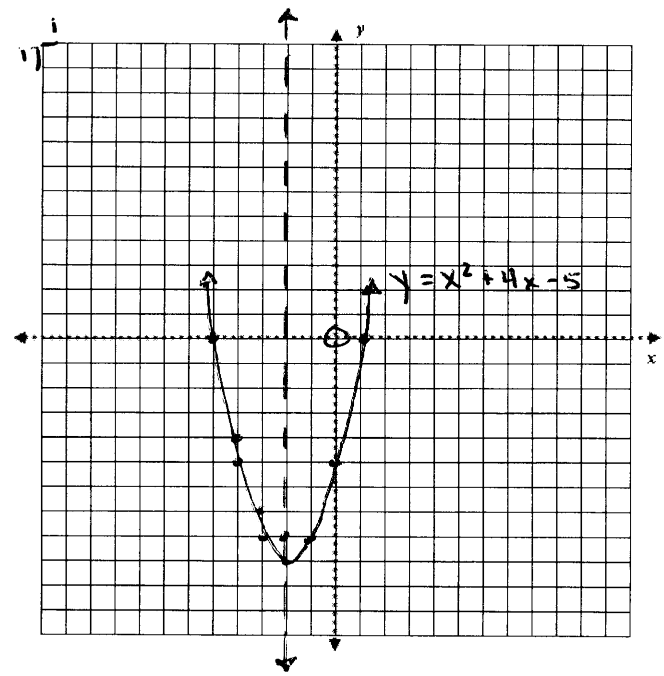
Axis of Symmetry: $x = \frac{-b}{2a}$ = $\frac{-4}{2(1)}$

$x = -2$

a = 1 b = +4 c = -5

D = -5 -4 -3 -2 -1 0 1

x		$y = x^2 + 4x - 5$
-5	0	$y = (-5)^2 + 4(-5) - 5$
-4	-5	$y = (-4)^2 + 4(-4) - 5$
-3	-8	$y = (-3)^2 + 4(-3) - 5$
-2	-9	$y = (-2)^2 + 4(-2) - 5$
-1	-8	$y = (-1)^2 + 4(-1) - 5$
0	-5	$y = (0)^2 + 4(0) - 5$
1	0	$y = (1)^2 + 4(1) - 5$



2. $y = x^2 - 2x - 3$

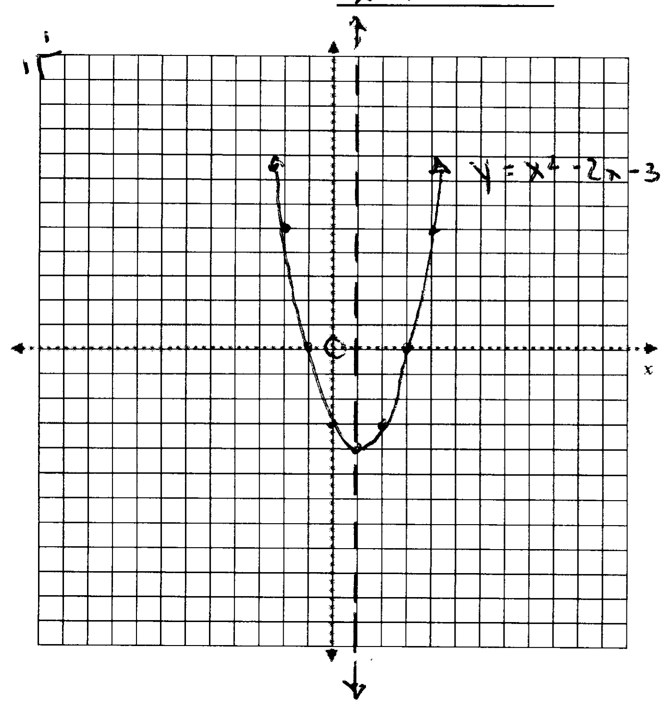
Axis of Symmetry: $x = \frac{-b}{2a}$ = $\frac{+2}{2(1)}$

$x = 1$

a = 1 b = -2 c = -3

D = -2 -1 0 1 2 3 4

x		$y = x^2 - 2x - 3$
-2	5	$y = (-2)^2 - 2(-2) - 3$
-1	0	$y = (-1)^2 - 2(-1) - 3$
0	-3	$y = (0)^2 - 2(0) - 3$
1	-4	$y = (1)^2 - 2(1) - 3$
2	-3	$y = (2)^2 - 2(2) - 3$
3	0	$y = (3)^2 - 2(3) - 3$
4	5	$y = (4)^2 - 2(4) - 3$

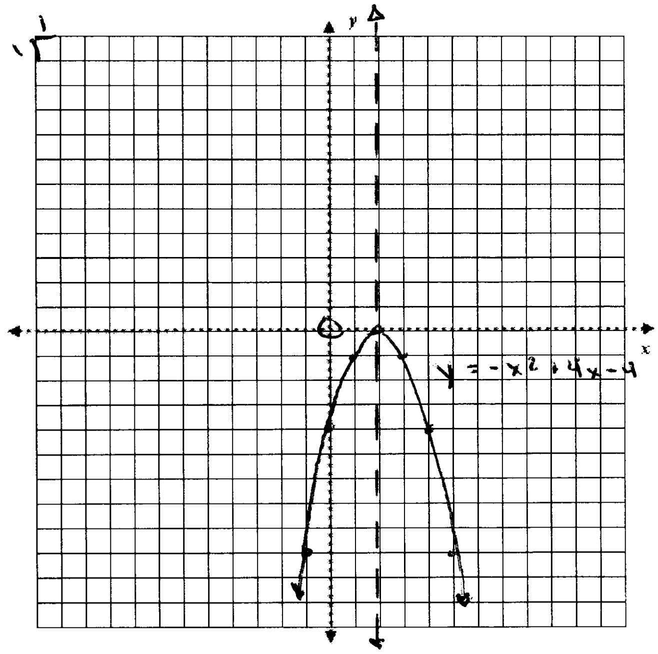


3. $y = -x^2 + 4x - 4$ Axis of Symmetry: $x = \frac{-b}{2a} = \frac{-4}{2(-1)}$

$x = +2$

a = -1 b = +4 c = -4

D = -1 0 1 2 3 4 5



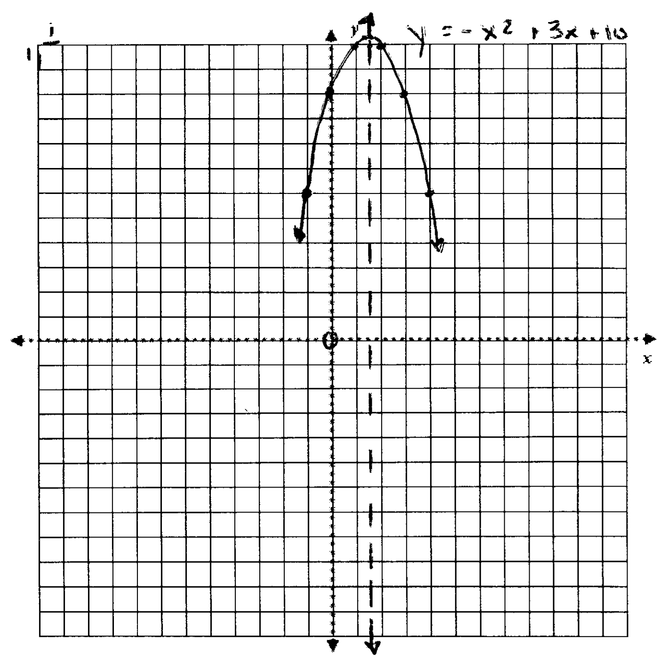
x		$y = -x^2 + 4x - 4$
-1	-9	$y = -(-1)^2 + 4(-1) - 4$
0	-4	$y = -(0)^2 + 4(0) - 4$
1	-1	$y = -(1)^2 + 4(1) - 4$
2	0	$y = -(2)^2 + 4(2) - 4$
3	-1	$y = -(3)^2 + 4(3) - 4$
4	-4	$y = -(4)^2 + 4(4) - 4$
5	-9	$y = -(5)^2 + 4(5) - 4$

3. $y = -x^2 + 3x + 10$ Axis of Symmetry: $x = \frac{-b}{2a} = x = \frac{-3}{2(-1)}$

$= \frac{3}{2}$ or 1.5

a = -1 b = +3 c = +10

D = -1 0 1 1.5 2 3 4



x		$y = -x^2 + 3x + 10$
-1	6	$y = -(-1)^2 + 3(-1) + 10$
0	10	$y = -(0)^2 + 3(0) + 10$
1	12	$y = -(1)^2 + 3(1) + 10$
1.5	12.5	$y = -(1.5)^2 + 3(1.5) + 10$
2	12	$y = -(2)^2 + 3(2) + 10$
3	10	$y = -(3)^2 + 3(3) + 10$
4	6	$y = -(4)^2 + 3(4) + 10$

Section 4. Multiplication and Division of Fractions

1. Reduce: $\dfrac{x^2 + 5x}{x^2 - 25}$

$$= \frac{x\cancel{(x+5)}}{\cancel{(x+5)}(x-5)}$$

$$= \frac{x}{(x-5)}$$

2. Reduce: $\dfrac{x^2 - 2x - 3}{x^2 + 2x - 15}$

$$= \frac{(x+1)\cancel{(x-3)}}{(x+5)\cancel{(x-3)}}$$

$$= \frac{(x+1)}{(x+5)}$$

3. Simplify: $\dfrac{14x^3y^2}{x^2 - 5x} \cdot \dfrac{10x - 50}{21x^2y}$

$$= \frac{\overset{2}{\cancel{14}}\,\cancel{x^3}\,\cancel{y^2}}{\cancel{x}\cancel{(x-5)}} \cdot \frac{10\cancel{(x-5)}}{\underset{3}{\cancel{21}}\,\cancel{x^2}\,\cancel{y}}$$

$$= \frac{20y}{3}$$

4. Divide: $\dfrac{(x-9)^2}{x^2 - 81} \div \dfrac{10x - 90}{5x + 45}$

Factor and Take Reciprocal 2nd Function

$$\frac{\cancel{(x-9)}\cancel{(x-9)}}{\cancel{(x+9)}\cancel{(x-9)}} \cdot \frac{5\cancel{(x+9)}}{10\cancel{(x-9)}}$$

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

Write in Proper Scientific Notation:

5. 125.4×10^{-5} $\quad$ 1.254×10^{-3}

6. 0.0453×10^{6} $\quad$ 4.53×10^{4}

Simplify: Take Your Time.

7. $\dfrac{14.25 \times 10^{9}}{(1.35 \times 10^{4})(5.30 \times 10^{-2})}$

$$\frac{14.25 \times 10^9}{7.155 \times 10^2}$$

$$= 1.991614256 \times 10^7$$

$$= 1.99 \times 10^7$$

8. $\dfrac{(5.25 \times 10^{3})(4.25 \times 10^{-7})}{(5.70 \times 10^{-10})}$

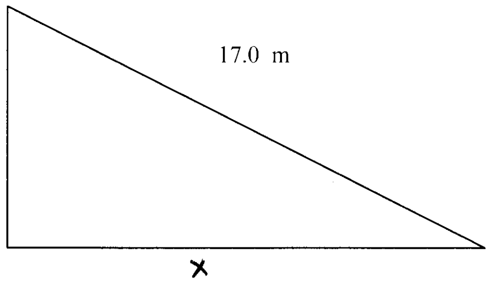
$$= \frac{22.3125 \times 10^{-4}}{5.70 \times 10^{-10}}$$

$$= 3.914473684 \times 10^6$$

$$= 3.91 \times 10^6$$

Resolve the Following: Use an Acceptable Technique. All answers need to be in proper significant digits.

1. Find the perimeter for the right triangle. 1. 38.2 m



$x^2 + (5.00)^2 = (17.0)^2$

$x^2 + 25 = 289$

$- 25 \quad - 25$

$\sqrt{x^2} = \sqrt{264}$

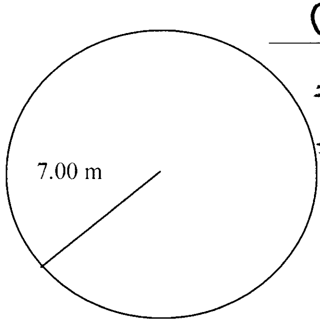
$x = 16.24807681$

$x = 16.2$

$5.00 + 17.0 + 16.2 = 38.2$ m

2. Find the Circumference for the following circles. Write the formula that you use on the line provided.

a. $C = 2\pi r$

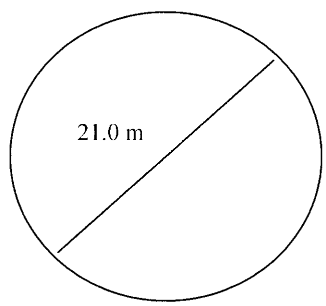


$= 2(3.14)(7.00)$

$= 43.96$ m

$= 44.0$ m

b. $C = \pi d$



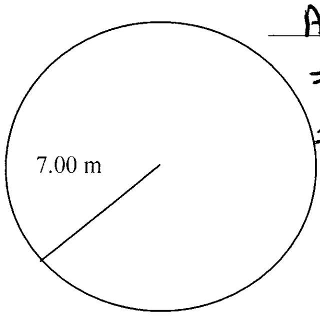
$= (3.14)(21.0)$

$= 65.94$ m

$= 65.9$ m

3. Find the Area for the following circles. Write the formula that you use on the line provided.

a. $A = \pi r^2$



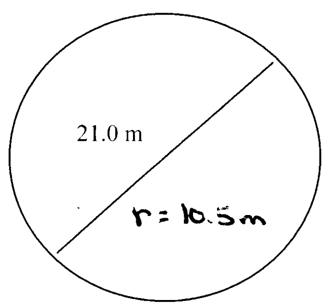
$= (3.14)(7.00)^2$

$= (3.14)(49.0)$

$= 153.86$ m^2

$= 154$ m^2

b. $A = \pi r^2$



$= (3.14)(10.5)^2$

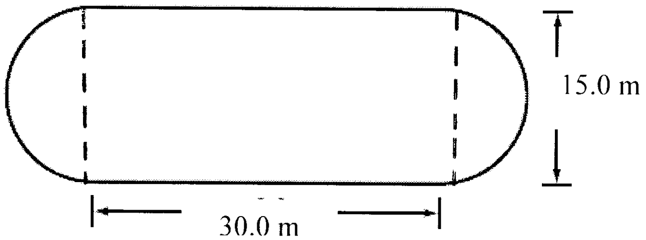
$= (3.14)(110.25)$

$= 346.185$ m^2

$= 346$ m^2

4. Find the Area for the following figures. Write the formula that you use on the line provided.

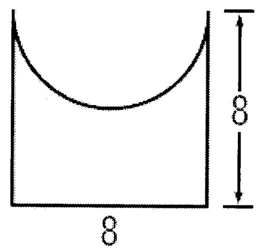
a. $A_T = 627\ m^2$



One Rectangle
$A = L \times W$
$= (30.0)(15.0)$
$= 450\ m^2$

One Circle
$A = \pi r^2$
$= (3.14)(7.5)^2$
$= (3.14)(56.25)$
$= 176.625$

b. $A_T = 38.9$



One Square
$A = L \times W$
$= 8 \times 8$
$= 64$

One 1/2 Circle
$A = \frac{1}{2}\pi r^2$
$= \frac{1}{2}\pi(4)^2$
$= .5(3.14)(16)$
$= 25.12$

Variation Section. Formulas in Play:

Varies Directly: $y = kx$

Varies Indirectly: $y = \frac{k}{x}$

Varies Directly As Square: $y = x^2$

Varies Indirectly as Square: $y = \frac{k}{x^2}$

1. The time t that it takes to travel a fixed distance varies inversely as the rate r at which one travels. Express t as a function of r. Solve for the value of the constant k when t = 4 and r = 55. Find the value of t when r = 45.

$t = \frac{k}{r}$

$4 = \frac{k}{55}$
$4(55) = k$
$220 = k$

$t = \frac{220}{45}$
$t = 4.88888889$
$t = 4.9$

2. The length L of a pendulum varies directly as the square of its period T. Express L as a function of T. Solve for the value of the constant k when L = 1.0 m and T = 2.0 sec. Find the value length of the pendulum when T = 4.0 sec.

$L = kT^2$

$1.0 = k(2.0)^2$
$\frac{1.0}{4} = \frac{4k}{4}$
$\frac{1}{4} = k$

$L = \frac{1}{4}(4.0\ sec)^2$
$L = \frac{1}{4}(16\ sec^2)$
$L = 4\ m$

3. The electrical resistance R of a wire varies directly as the length L of the wire. Express R as a function of L, if R = 1.5 Ω when L = 75 m. Find the resistance of a similar wire whose length is 80 m.

$R = kL$

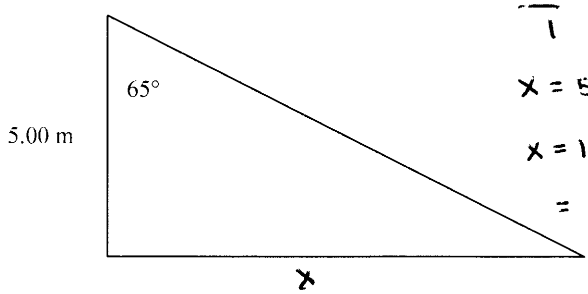
$1.5 = \frac{k}{75}$
$1.5(75) = k$
$112.5 = k$

$R = \frac{112.5}{80}$
$R = 1.40625$
$= 1.4\ \Omega$

Resolve the Following: Use an Acceptable Technique. All answers need to be in proper significant digits.

4. Find the area for the right triangle.

4. 26.8 m2



$\frac{\tan 65}{1} = \frac{x}{5.00}$

$x = 5.00 \tan 65$

$x = 10.7225346$

$= 10.7$

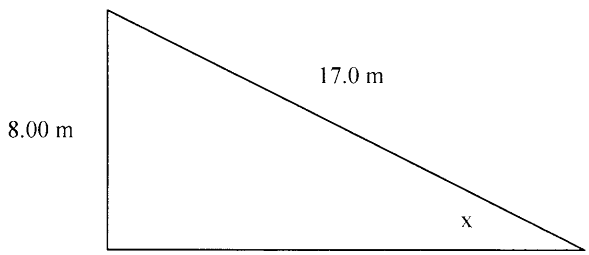
$A = \frac{1}{2}(10.7)(5.00)$

$= 26.75\ m2$

$= 26.8\ m2$

5. Find the measure of the indicated angle.

5. 28°



$\sin x = \frac{8.00}{17.0}$

$\sin^{-1}(8/17)$

$x = 28°$ (Nearest Degree)

6. Given ΔABC ~ Δ AEF, and that $\overline{AD} = 8.00$, $\overline{DB} = 4.00$, $\overline{AC} = 18.00$, and $\overline{DE} = 6.00$. ∠ A = 65°, ∠ ABC = 75°, find x and y.

1. Find x

$\frac{8}{6} = \frac{12}{x}$

$72 = 8x$

$9 = x$

$9.00m = x$

2. Find y

$\frac{8}{12} = \frac{y}{18}$

$12y = 144$

$y = 12$

$y = 12.0m$