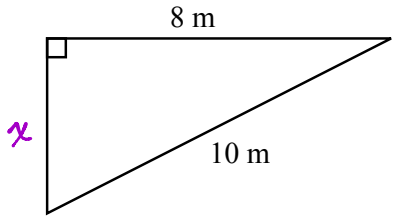
Perimeter, Area & Volume

Use your EQAO formula sheet and **calculator** for this part of the review. *(Recall: $\pi \approx 3.14159$)*

1. For each of the following figures, find the perimeter and area, to one decimal place.

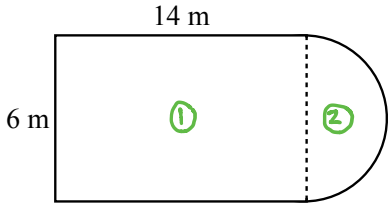
a)



$x^2 = 10^2 - 8^2$
$= 36$
$x = 6$
$P = 8 + 10 + 6$
$= 24$
$\therefore P = 24$ m.

$A = \frac{bh}{2}$
$= \frac{6(8)}{2}$
$= 24$
$\therefore A = 24$ m^2.

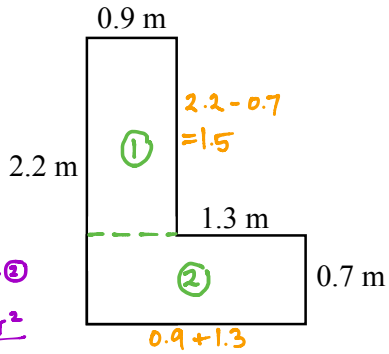
b)



$P = 14 + \frac{\pi d}{2} + 14 + 6$
$= 34 + \frac{\pi(6)}{2}$
$= 34 + 3\pi$
$\doteq 43.4$
$\therefore P \doteq 43.4$ m.

$A_{total} = A_{①} + A_{②}$
$= lw + \frac{\pi r^2}{2}$
$= 14(6) + \frac{\pi(3)^2}{2}$
$\doteq 98.1$
$\therefore A \doteq 98.1$ m^2.

c)

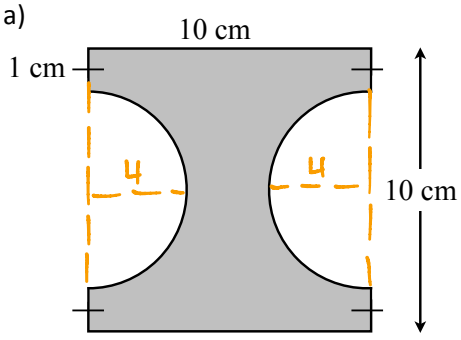


$P = 0.9 + 1.5 + 1.3 + 0.7 + 2.2 + 2.2$
$= 8.8$
$\therefore P = 8.8$ m.

$A_{total} = A_{①} + A_{②}$
$= l_1 w_1 + l_2 w_2$
$= (1.5)(0.9) + (2.2)(0.7)$
$\doteq 2.9$
$\therefore A \doteq 2.9$ m^2.

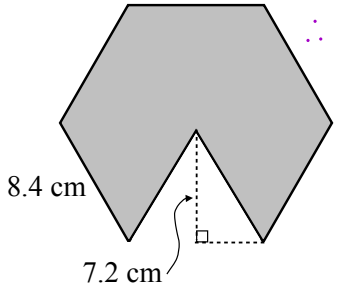
2. Calculate the area of the shaded region.

a)



$A_{shaded} = A_{square} - A_{circle}$
$= 5^2 - \pi r^2$
$= (10)^2 - \pi(4)^2$
$\doteq 49.7$
$\therefore$ the shaded area is approximately 49.7 cm^2.

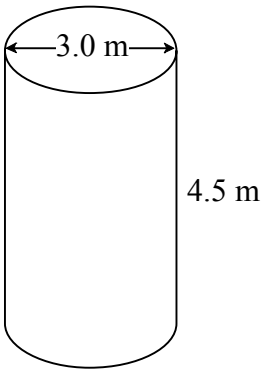
b)



$A_{shaded} = A_{hexagon} - A_{triangle}$
$= 6\left(\frac{bh}{2}\right) - \frac{bh}{2}$
$= 5\left(\frac{bh}{2}\right)$
$= 5\left[\frac{(18.4)(7.2)}{2}\right]$
$= 151.2$
$\therefore$ the shaded area is 151.2 cm^2.

3. For each of the following, calculate the total surface area and volume, to one decimal place.

a)



$SA = 2\pi r^2 + 2\pi rh$

$= 2\pi(1.5)^2 + 2\pi(1.5)(4.5)$

$\doteq 56.5$

$\therefore SA \doteq 56.5\ m^2.$

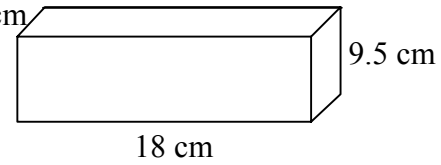
$V = \pi r^2 h$

$= \pi(1.5)^2(4.5)$

$\doteq 31.8$

$\therefore V \doteq 31.8\ m^3.$

b)



$SA = 2(wh + lw + lh)$

$= 2[(6.5)(9.5) + 18(6.5) + 18(9.5)]$

$= 699.5$

$\therefore SA = 699.5\ cm^2.$

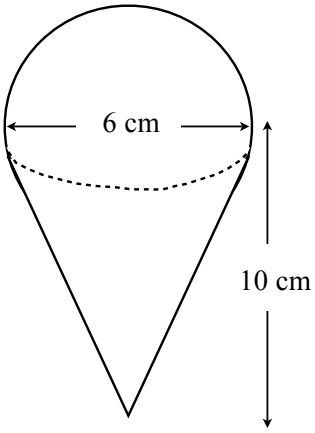
$V = lwh$

$= 18(6.5)(9.5)$

$= 1111.5$

$\therefore V = 1111.5\ cm^3.$

4. Find the volume of ice cream needed for the cone and scoop shown below, to the nearest whole number.



$V_{total} = V_{hemisphere} + V_{cone}$

$= \frac{1}{2}\left(\frac{4}{3}\pi r^3\right) + \frac{\pi r^2 h}{3}$

$= \frac{2\pi(3)^3}{3} + \frac{\pi(3)^2(10)}{3}$

$= \frac{2\pi(27)}{3} + \frac{\pi(9)(10)}{3}$

$= 18\pi + 30\pi$

$= 48\pi$

$\doteq 151$

$\therefore$ the volume of ice cream needed is approximately $151\ cm^3$.

 Date: _____

Analytic Geometry

1. Fill in the blanks.

a) When data plotted on a grid falls to the right, this is described as _negative_ correlation.

b) In which quadrant are *x*-coordinates negative and *y*-coordinates positive? _II_

c) The point $(8,0)$ is on the _x_ -axis. The coordinates of the origin are _(0,0)_.

d) The slope of all vertical lines is _undefined_. The slope of all horizontal lines is _0_.

e) Lines that rise to the right have _positive_ slopes.

f) In the line $y=-3x+7$, the slope is _-3_ and the *y*-intercept is _7_.

g) The equation of the line with slope $\frac{2}{3}$ and *y*-intercept 6, in $y=mx+b$ form is _$y=\frac{2}{3}x+6$_.

h) The rise can be found by calculating the difference in the _y_-coordinates.

i) A vertical line has a run of _0_.

j) A relation of the form $y=mx$ shows _direct_ variation, while a relation of the form $y=mx+b$ shows _partial_ variation.

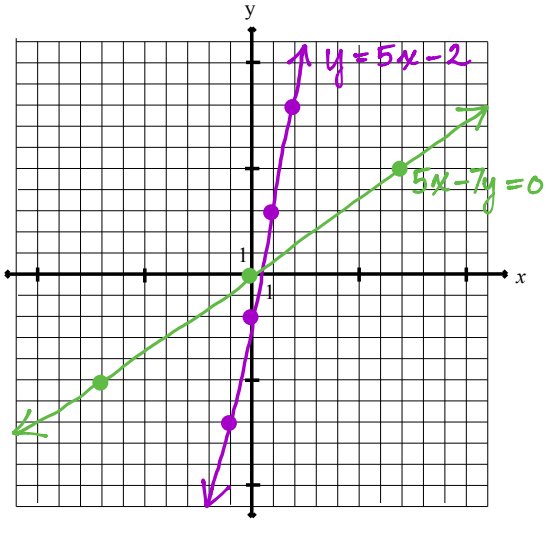
k) For a house call, a plumber charges according to the relation $C=35t+40$ where C is the charge in dollars and t is time in hours. The fixed charge is _$40_ and the hourly rate is _$35_.

l) The slope of any line parallel to $y=-7x+2$ is _-7_. The slope of any line perpendicular to $y=-7x+2$ is _$\frac{1}{7}$_.

2. Graph the following lines on the given grids using the indicated method.

a) $y=5x-2$ (table of values)

x	y
-2	-12
-1	-7
0	-2
1	3
2	8



b) $5x-7y=0$
(method of your choice)

$\frac{-7y}{-7}=\frac{-5x}{-7}$

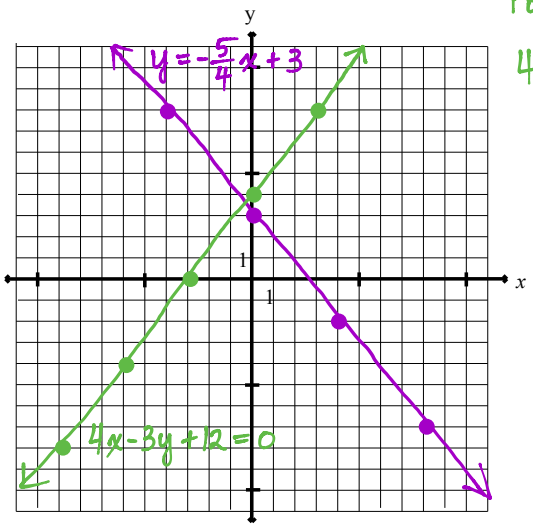
$y=\frac{5}{7}x$

$m=\frac{5}{7}$

$b=0$

c) $y = -\frac{5}{4}x + 3$ (slope, *y*-intercept method)

Slope = $-\frac{5}{4}$ *y*-intercept = 3



d) $4x - 3y + 12 = 0$
(*x*- and *y*-intercept method – show your work)

For *x*-int, let $y = 0$

$4x + 12 = 0$

$\frac{4x}{4} = \frac{-12}{4}$

$x = -3$

[Plot $(-3, 0)$]

For *y*-int, let $x = 0$

$-3y + 12 = 0$

$\frac{-3y}{-3} = \frac{-12}{-3}$

$y = 4$

[Plot $(0, 4)$]

e) Using the equations from b) and c), solve by comparison to determine the exact point of intersection.

$5x - 7y = 0$

$\frac{-7y}{-7} = \frac{-5x}{-7}$

$y = \frac{5}{7}x$ ①

$y = -\frac{5}{4}x + 3$ ②

Sub ① into ②

$\frac{5}{7}x = -\frac{5}{4}x + 3$

$28\left(\frac{5}{7}x\right) = 28\left(-\frac{5}{4}x\right) + 28(3)$

$20x = -35x + 84$

$20x + 35x = 84$

$\frac{55x}{55} = \frac{84}{55}$

$x = \frac{84}{55}$

Sub $x = \frac{84}{55}$ into ①

$y = \frac{5}{7}\left(\frac{84}{55}\right)$

$= \frac{12}{11}$

∴ the exact point of intersection is $\left(\frac{84}{55}, \frac{12}{11}\right)$.

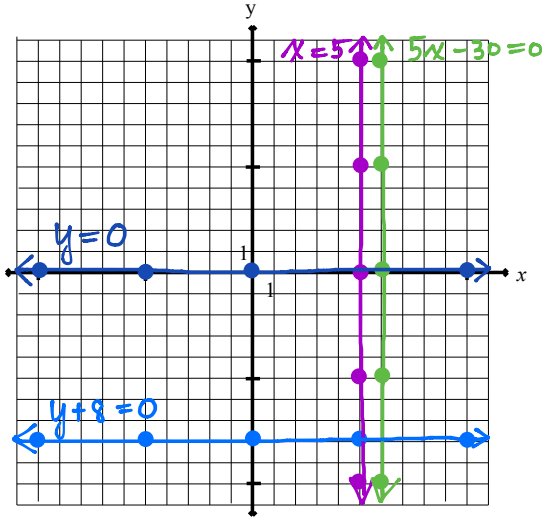
3. Graph on the same set of axes.

a) $x = 5$

b) $y = 0$

c) $y + 8 = 0$ $y = -8$

d) $5x - 30 = 0$ $\frac{5x}{5} = \frac{30}{5}$ $x = 6$



4. State the slope and *y*-intercept for each of the following.

a) $y = 5x + 2$

$m = 5$

$b = 2$

b) $y = -\frac{1}{2}x$

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

$b = 0$

c) $y = \frac{3}{5}x - 8$

$m = \frac{3}{5}$

$b = -8$

d) $y = 10$

$m = 0$

$b = 10$

5. Change to slope, *y*-intercept form. Then, state the slope and *y*-intercept.

a) $2x - 3y + 15 = 0$

$\frac{-3y}{-3} = \frac{-2x - 15}{-3}$

$y = \frac{2}{3}x + 5$

$m = \frac{2}{3}$

$b = 5$

b) $y - 15 = 0$

$y = 15$

$m = 0$

$b = 15$

c) $15x + 25y - 30 = 0$

$\frac{25y}{25} = \frac{-15x + 30}{25}$

$y = -\frac{3}{5}x + \frac{6}{5}$

$m = -\frac{3}{5}$

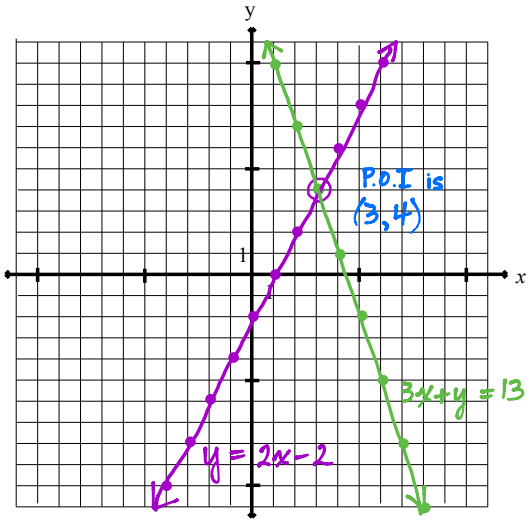
$b = \frac{6}{5}$

6. By graphing, determine the point of intersection of the lines $y = 2x - 2$ and $3x + y = 13$.

$y = 2x - 2$

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

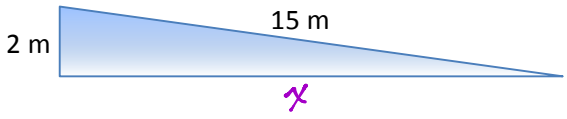
$b = -2$



$3x + y = 13$

$y = -3x + 13$

7. Determine the slope of the wheelchair ramp. Assume $90°$ between the horizontal and the vertical.



Let x represent the run of the ramp, in m.

$x^2 = 15^2 - 2^2$

$= 225 - 4$

$= 221$

$x = \sqrt{221}$

$\text{slope} = \frac{\text{rise}}{\text{run}}$

$= \frac{2}{\sqrt{221}}$

$\doteq 0.13$

$\therefore$ the slope of the ramp is approximately 0.13.

8. Using the slope formula, determine the slope of the line through each set of points.

a) $(1,3)$ and $(5,2)$

$m = \frac{2-3}{5-1}$

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

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

b) $(-2,7)$ and $(-5,-1)$

$m = \frac{-1-7}{-5+2}$

$= \frac{-8}{-3}$

$= \frac{8}{3}$

c) $(4,5)$ and $(-6,5)$

$m = \frac{5-5}{-6-4}$

$= \frac{0}{-10}$

$= 0$

d) $(-2,6)$ and $(-2,-6)$

$m = \frac{-6-6}{-2+2}$

$= \frac{-12}{0}$

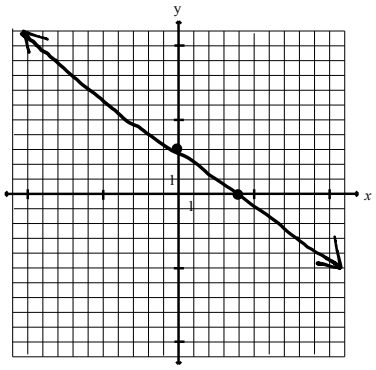
$\therefore$ m is undefined.

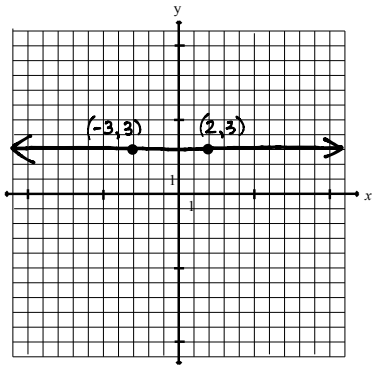
9. State the equation of each line below.

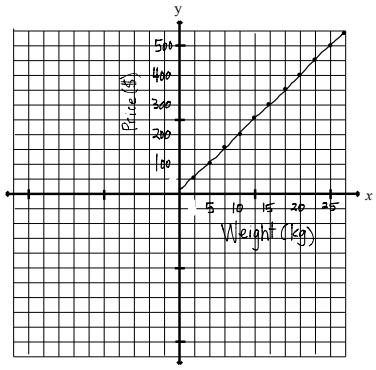
a) $y = -\frac{3}{4}x + 3$

b) $y = 3$

c) $y = 20x$







10. Find the equation of each line in the form $y = mx + b$.

a) with slope 5 and *y*-intercept -10

$\because m = 5$ and $b = -10$, $\therefore y = 5x - 10$.

b) with *y*-intercept 6 and perpendicular to the line $y = \frac{2}{5}x - 10$

$m = \frac{2}{5}$ $\therefore m_{\perp} = -\frac{5}{2}$ $\because m = -\frac{5}{2}$ and $b = 6$ $\therefore y = -\frac{5}{2}x + 6$.

c) through the point $(0,-2)$ and parallel to the line $y = -4x + 7$

$m = -4$ $\therefore m_{//} = -4$ $\because (0,-2)$ is the y-int, $b = -2$.

$\because m = -4$ and $b = -2$ $\therefore y = -4x - 2$.

d) with slope $\frac{1}{3}$ and passing through $(6,-2)$

$m = \frac{1}{3}$ $b = ?$ $x = 6$ $y = -2$

$y = mx + b$

$-2 = \frac{1}{3}(6) + b$

$-2 = 2 + b$

$-2 - 2 = b$

$-4 = b$

$\therefore y = \frac{1}{3}x - 4$.

e) passing through points $(-2,3)$ and $(5,-3)$

Find m.

$m = \frac{-3-3}{5+2}$

$= \frac{-6}{7}$

$= -\frac{6}{7}$

Find b.

$m = -\frac{6}{7}$ $b = ?$ $x = -2$ $y = 3$

$y = mx + b$

$3 = -\frac{6}{7}(-2) + b$

$3 = \frac{12}{7} + b$

$3 - \frac{12}{7} = b$

$\frac{21}{7} - \frac{12}{7} = b$

$\frac{9}{7} = b$

$\therefore y = -\frac{6}{7}x + \frac{9}{7}$

f) perpendicular to $y = -\frac{1}{2}x + 6$ with the same *y*-intercept as the line $y = 3x - 2$

$m = -\frac{1}{2} \therefore m_{\perp} = 2$ $\because m = 2$ and $b = -2$ $\therefore y = 2x - 2$.

11. A house is expected to increase in value according to the relation $y = 6500x + 150\ 000$ where *y* is the value of the house, in dollars, after *x* years.

a) Find the slope of the line and interpret its meaning.

$m = \frac{6500\ (\$)}{1\ (\text{year})}$ This means the value of the house increases by \$6500 every year.

b) Find the *y*-intercept and interpret its meaning.

$b = 150\ 000\ (\$)$ This means the house was initially worth \$150 000.

c) Find the value of the house after 12 years.

Let $x = 12$

$y = 6500(12) + 150\ 000$

$= 228\ 000$

$\therefore$ the value of the house after 12 years is \$228 000.

12. Jeff's family is driving home from a camping trip. They are using cruise control so their speed is constant. After 1 hour, they are 250 km away from home. After 3 hours, they are 50 km from home.

a) What is the independent variable?

time (h)

b) What is the dependent variable?

distance from home (km)

c) Represent the given information as two ordered pairs.

(1, 250) (3, 50)

d) Write an equation for the relation in the form $y = mx + b$.

Find m.

$m = \frac{50-250}{3-1}$

$= \frac{-200}{2}$

$= -100$

Find b.

$m = -100$ $b = ?$ $x = 1$ $y = 250$

$y = mx + b$

$250 = -100(1) + b$

$250 + 100 = b$

$350 = b$

$\therefore y = -100x + 350.$

e) Interpret the meaning of the slope and *y*-intercept in this situation.

$m = -100$ This means Jeff's family is travelling 100km/h, towards home.

$b = 350$ This means the camping trip was 350 km away from home.

13. Using 1st differences, determine whether the following models represent linear or non-linear relations. Give a reason for your choice.

a)

x	y	Δy
0	-11	
-1	-6	
-2	-1	
-3	4	
-4	9	

$-11 + 6 = -5$

$-6 + 1 = -5$

$-1 + 4 = -5$

$4 + 9 = -5$

Type linear

Reason first differences are constant

b)

x	y	Δy
3	18	
2	11	
1	6	
0	3	
-1	2	

$18 - 11 = 7$

$11 - 6 = 5$

$6 - 3 = 3$

$3 - 2 = 1$

Type non-linear

Reason first differences are not constant

14. Which of the following relations are linear?

$y = mx + b$

a) $y = 2x - 5$ [1st degree]

b) $y = x^2 + 5$ [second degree]

Vertical line

c) $x = 9$ [1st degree]

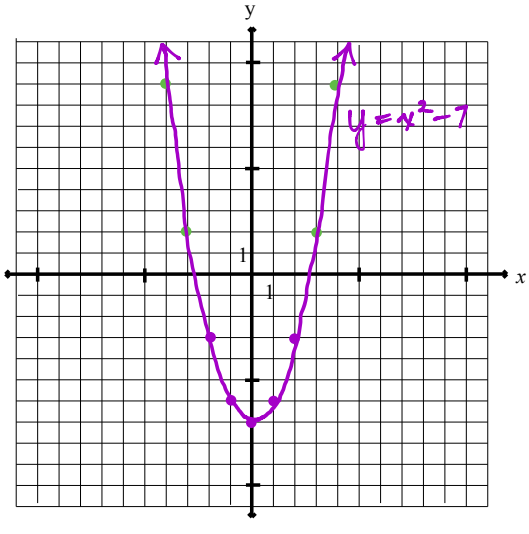
horizontal line

d) $y - 7 = 0$ [1st degree]

e) $x^2 + y^2 = 25$ [second degree]

15. Graph the relation $y = x^2 - 7$ using a table of values for values of *x* of -2, -1, 0, 1, 2.

x	y
-2	-3
-1	-6
0	-7
1	-6
2	-3



16. A plumber charges $35 for a house call and an hourly rate of $50/h. Write an equation representing the total charges. Introduce variables using "let statements" then graph the relation for up to 6 hours.

Let y represent the total charges, in $.
Let x represent time, in hours.

$y = 50x + 35$

$m = 50$
$b = 35$

or...

x (h)	y ($)
0	35
1	85
2	135
3	185
4	235
5	285
6	335

Total Charges vs. Time