Name : Solutions

Practice Final
Chapter 3 – Polynomials

NO Calculator

1. Factor these expressions as much as possible.

a) $x^2 + 4x - 12$ $= (x+6)(x-2)$

$\otimes -12$
$\oplus 4$

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

$\otimes -4$
$\oplus -3$

c) $50x^3y - 15xy^2$ $= 5xy(10x^2 - 3y)$

d) $9x^2 - 24x + 16$ $= (3x-4)^2$

$3x$ $\quad$ 4

e) $-5x^2 + 35x - 50$ $= -5(x^2 - 7x + 10) = -5(x-5)(x-2)$

$\otimes 10$
$\oplus -7$

f) $25x^2 - 1$ $= (5x+1)(5x-1)$

e) $2x^2 - 8x + 8$ $= 2(x^2 - 4x + 4) = 2(x-2)^2$

e) $49x^2y^3 - 14x^3y^2$ $= 7x^2y^2(7y - 2x)$

e) $27x^2 - 75$ $= 3(9x^2 - 25) = 3(3x+5)(3x-5)$

e) $5x^2 - 45x + 40$ $= 5(x^2 - 9x + 8) = 5(x-1)(x-8)$

2. Expand and simplify :

a) $(4x+5)(x-1)$ $= 4x^2 - 4x + 5x - 5$

$= 4x^2 + x - 5$

b) $(5x-6)^2$ $= 25x^2 - 60x + 36$

c) $(x+3)(x-5) - (5x+3)(x-7)$ $= x^2 - 5x + 3x - 15 - (5x^2 - 35x + 3x - 21)$

$= x^2 - 2x - 15 - 5x^2 + 32x + 21$

$= -4x^2 + 30x + 6$

d) $(x-3)^2 + 5x(x-4)$ $= x^2 - 6x + 9 + 5x^2 - 20x$

$= 6x^2 - 26x + 9$

e) $3(2x-8) - (3x-5)^2$ $= 6x - 24 - (9x^2 - 30x + 25)$

$= -9x^2 + 36x - 49$

f) $-5(x-5)(x+6)$ $= -5(x^2 + 6x - 5x - 30)$

$= -5x^2 - 5x + 150$

3. Determine the value of k such that the expression factors into a perfect square :

a) $x^2 + 10x + k$

x ↓ ↑ DP

$2 \times x \times ?$

5

$k = 25$

b) $4x^2 - 20x + k$

$2x$ ↑ ↑

$2 \times (2x) \times ?$

5

$k = 25$

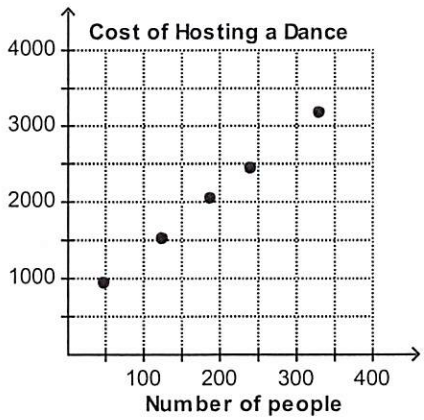
Practice Final
Chapter 5 – Relations and Functions

1. Let $g(x) = -\frac{2}{3}x + 5$. Determine x such that $g(x) = 25$.

$25 = -\frac{2}{3}x + 5$ $\quad -\frac{60}{2} = x$ $\quad \boxed{x = -30}$

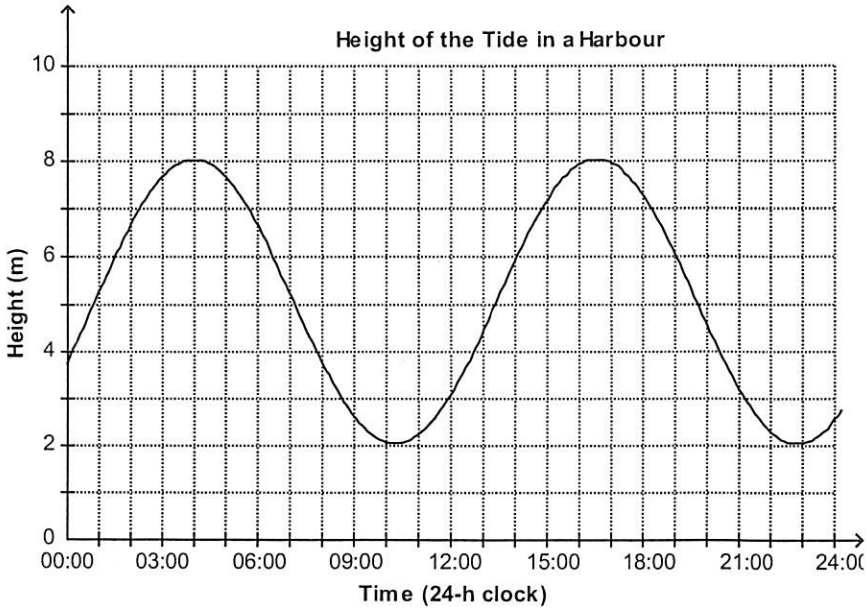
$20 = -\frac{2}{3}x$

2. Does the following graph represent a function ? Explain.



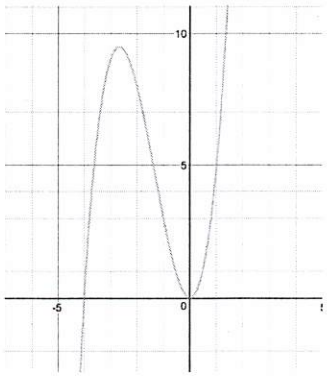
yes : vertical line test

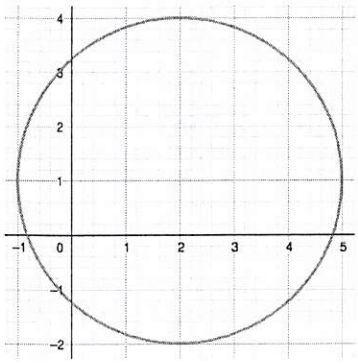
3. What is the max height of the tide that day?



8 m

4. Do the following graphs represent functions ? Explain. Determine their Domain and Range.





Function : yes

Domain : $\mathbb{R}$

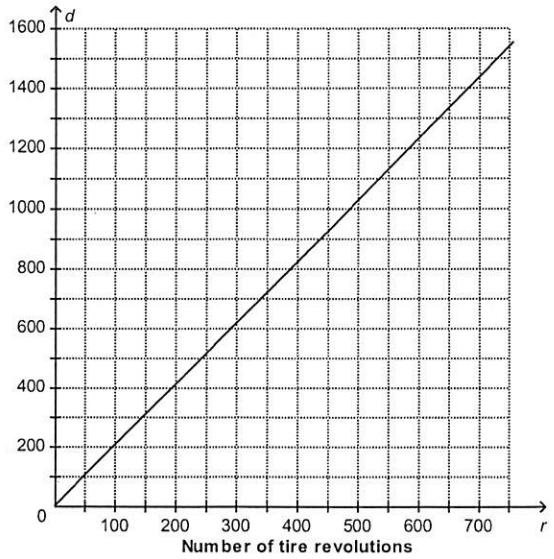
Range : $\mathbb{R}$

Function : no (vertical line test)

Domain : $[-1, 5]$

Range : $[-2, 4]$

5. The following graph represents the relation between the distance travelled by a vehicle and the number of tire revolutions. This relation can be modelled by the equation: $d = 2.07r$, where d is the distance travelled in metres and r the number of tire rvolutions. What is the distance travelled after 300 tire revolutions? Is the phenomenon discreet or continuous? Explain.

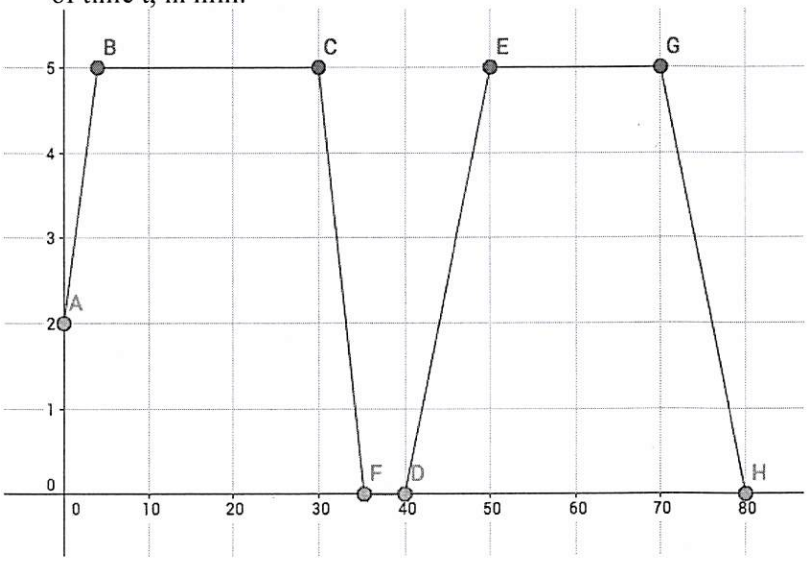


$d = 2.07 \times 300$

$\boxed{d = 621 \text{ m}}$

Continuous phenomenon (points are connected). All the values "in between" make sense.

6. Create a story to describe Gail's trip, according to the following graph representing its speed in km/h as a function of time t, in min.



Gail starts running at a speed of 2km/h. He accelerates for 4 min approx.
Then Gail continues running at a constant speed of 5km/h.
Then he slows down and stops for 5 min, then starts again...
She stops after 8 min.

7. Let $f(x) = -2x^2 + x - 5$. Determine $f(-3)$.

$f(-3) = -2(-3)^2 + (-3) - 5$
$= -2 \times 9 - 8 = \boxed{-26}$

8. A hélicoptère flies towards its destination.

Time (min)	Distance to Destination (mi.)
0	285
20	244
40	203
60	162
80	121

(+20, +20, +20, +20 between rows; −41, −41, −41, −41 between rows)

a. Identify the dependent and independent variables.

dependent : distance independent : time

b. Is it a linear situation?

yes (see table)

c. If it is linear, determine its rate of change.

$\tau = \frac{-41}{20} = -2.05$ mi/min

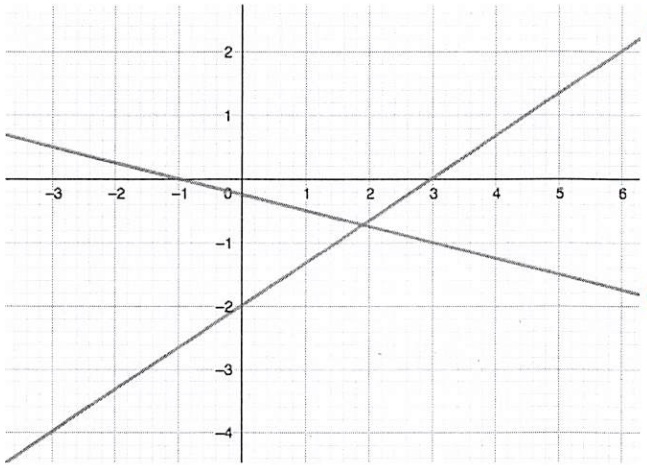
d. If we assume that the helicopter continues with the same velocity, in how long will it reach its destination to the nearest minute?

$y = -2.05x + 285$

$0 = -2.05x + 285$
$2.05x = 285$
$x = \frac{285}{2.05}$
$\boxed{x \simeq 139 \text{ min}}$

Practice Final
Chapter 6 – Linear Functions

1. Determine the equations of the following lines.



d_1: $m=\frac{2}{3}$ y-int: -2

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

d_2: $m=-\frac{1}{4}$ y-int: ?

point $(-1,0)$

$y-0=-\frac{1}{4}(x+1)$

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

2. Rewrite in general form: $y-5=\frac{3}{5}(x+5)$.

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

$5y-25=3x+15$

$3x-5y+40=0$

3. A line goes through points $(a,3)$ and $(2,9)$. Its slope is $\frac{3}{5}$. Determine the value of a.

$\frac{9-3}{2-a}=\frac{3}{5}$

$\frac{6}{2-a}=\frac{3}{5}$

$30=3(2-a)$

$30=6-3a$

$3a=-24$

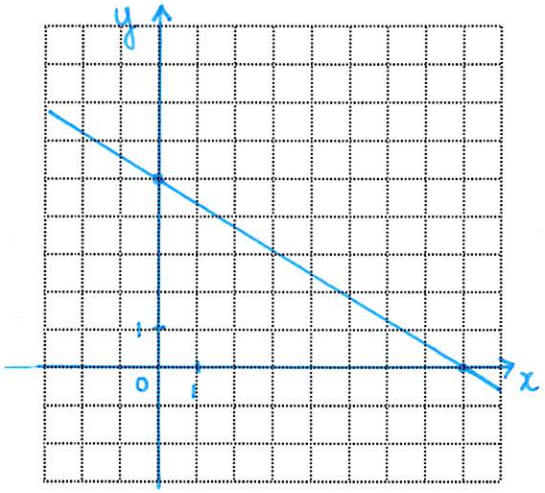
$a=-8$

4. A line has x-intercept -8 and y-intercept 5.
Determine an equation of a line that is perpendicular to it and passes through point (-3 ;2).

Points: $(-8,0)$ & $(0,5)$ $m=\frac{5}{8}$ $m_\perp=-\frac{8}{5}$

$y-2=-\frac{8}{5}(x+3)$

5. Determine algebraically the x- and y-inrecepts of the line with equation : $5x + 8y = 40$ and graph it.



y-int : $(x = 0)$

$8y = 40$

$\boxed{y = 5}$

x-int : $(y = 0)$

$5x = 40$

$\boxed{x = 8}$

6. Francine owns a T-shirts business.
She charges \$50 for each order, plus \$8.95 per t-shirt ordered.

a) Write an equation of the total cost, C, in dollars, as a function of the number of T-shirts ordered n.

$C = 8.95n + 50$

b) Marnell ordered 62 T-shirts. How much is she going to pay ?

$C = 8.95 \times 62 + 50$

$C = \$604.90$

c) Jacob paid \$971.85. How many T-shirts did he order?

$971.85 = 8.95n + 50$

$921.85 = 8.95n$

$n = \frac{921.85}{8.95}$ $\boxed{n = 103}$

7. Determine the slope of the line with equation : $7x + 3y + 5 = 0$.

$3y = -7x - 5$

$y = -\frac{7}{3}x - \frac{5}{3}$

slope : $-\frac{7}{3}$

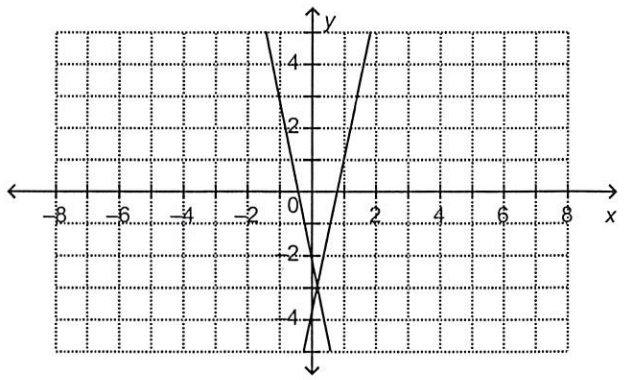
Practice Final
Chapter 7 – Systems of Linear Equations

1. Create a system of linear equations to model the following situation:
Tickets for a play are sold \$8 for adults and \$4.75 for kids.
10 more tickets have been sold for kids than for adult. \$1399 total has been collected with the sale.

x : # kids tickets
y : # adult tickets

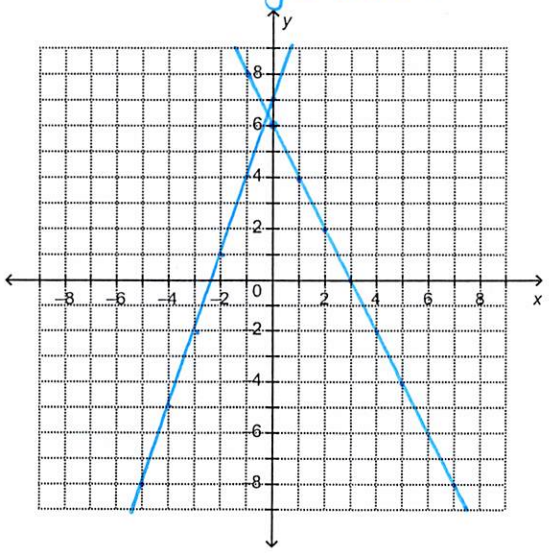
$$\begin{cases} x = y + 10 \\ 8y + 4.75x = 1399 \end{cases}$$

2. Use the following graph to solve the system of linear equations : $y = -5x - 2$
$y = 5x - 4$



Solution : $(0.2, -3)$ approx.

3. Solve graphically the following system, then solve it algebraically.
$y - 8 = 5x \longrightarrow y = -2x + 6$
$2x + y = 1 \longrightarrow y = 3x + 7$



Solution $(-0.2, 6.4)$ approx

(1) $y = -2x + 6$

(2) $-3x + (-2x + 6) = 7$

$-3x - 2x + 6 = 7$

$-5x = 1$

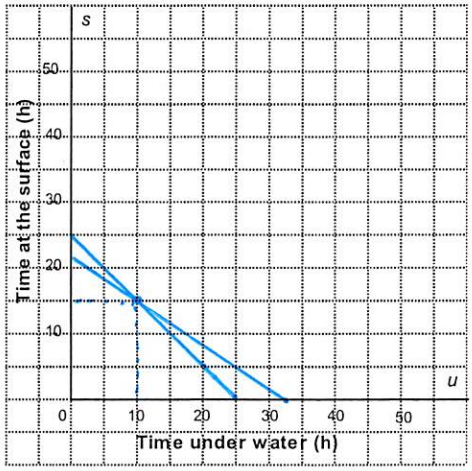
$x = -\frac{1}{5}$

(1) $y = -2\left(-\frac{1}{5}\right) + 6$

$y = \frac{2}{5} + \frac{30}{5}$

$y = \frac{32}{5}$

4. A submarine moves at a speed of 20 km/h under water and 30 km/h on the surface.
The submarine travelled 650km in 25h. This situation can be modelled by the system :
$u + s = 25$
$20u + 30s = 650$
where u represents the time travelled under water and s represents the time travelled on the surface.
   a) Graph both equations.
   b) Solve the system graphically :



$(d_1)\ s = -u + 25$

$(d_2)\ s = -\frac{2}{3}u + \frac{65}{3}$

solution : (10, 15)

h under water

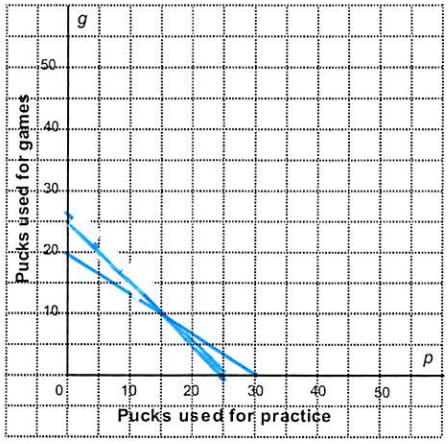
h on the surface.

5. a) Create a system of linear equations to model the following situation: A coach bought 25 pucks for its team for \$70. Puck for practice cost \$2.50 each and pucks for games cost \$3.25 each.

x : # practice pucks
y : # games pucks

$$\begin{cases} x + y = 25 \\ 2.5x + 3.25y = 70 \end{cases}$$

b) Solve the system graphically and write a conclusion.



x	15	2	28
y	10	20	0

solution : (15, 10)

15 pucks for practices
10 pucks for games.

6. Create a system of equestions to model the following situation: For a school show, adult tickets cost \$6 and students tickets cost \$4. There were twice more students than adults. \$2016 was made.

x : # students tickets
y : # adults tickets

$$\begin{cases} 4x + 6y = 2016 & (1) \\ x = 2y & (2) \end{cases}$$

Solve the problem by substitution. Write a conclusion sentence.

(2) $x = 2y$

(1) $4(2y) + 6y = 2016$

$8y + 6y = 2016$

$14y = 2016$

$y = 144$

(2) $x = 2(144)$

$x = 288$

$\Rightarrow$ 288 students & 144 adults.

7. Determine the number of solutions of the following system :

$6s + 6c = 50$ $\longrightarrow$ $s = -c + \frac{25}{3}$

$6s - 6c = 30$ $\longrightarrow$ $s = c + 6$

not the same slope!

$\Rightarrow$ 1 solution!