Key

Relations and Functions

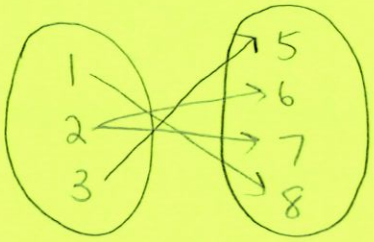
Key Ideas:

1. **Representing Relations**
   - **Arrow diagrams, tables of values, ordered pairs, words**
2. **Domain (x) and Range (y)**
   - **Look for boundary points**
   - **$x \in \mathbb{R}, y \in \mathbb{R}$ (graph hits every x and y value)**
   - **$x \leq 4, y > -4$ (look for a definite start and end)**
   - **$-3 \leq x \leq 6, or -5 < y < 0$ (closed interval)**
3. **Functions**
   - **For every x, there is only one y**
   - **Vertical line test**
4. **Representing Linear Relations**
   - **Graph (a line)**
   - **Equation (degree of 1, ie: $y = 2x - 5$)**
   - **Table of values/set of ordered pairs (constant change in x and constant change in y)**
5. **Interpreting Graphs**
6. **Functional Notation**
   - **Re-write "y" as "$f(x)$"**
   - **Solve $f(-3)$, work forwards**
   - **Solve $f(x) = 5$, work backwards**
   - **Functions can be given as:**
     i. **graph**
     ii. **table of values**
     iii. **set of ordered pairs**
     iv. **mapping diagram**
     v. **Equation**

***Note: Watch your positive and negative signs!!**

Representing Relations/Domain/Range/Functions

1. a) Represent the following as an ***arrow diagram***:
$\{(1,8),(2,7),(2,6),(3,5)\}$



b) Is this a ***function***, how do you know?

No, every value of x does not have one specific value of y

c) State the ***domain***:

D: $\{1, 2, 3\}$

d) State the ***range***:

R: $\{5, 6, 7, 8\}$

2. This table represents a relation.

a) Describe the relation in words.

the athlete is associated with the sport

Name	***Sport***
Perdita Felicien	Track
Donavan Bailey	Track
Nancy Greene	Skiing
Annamay Pierse	Swimming
Justin Morneau	Baseball
Steve Nash	Basketball

b) Represent this relation as a set of ordered pairs.

{(Perdita Felicien, Track), (Donovan Bailey, Track), (Nancy Greene, Skiing), (Annamay Pierse, Swimming), (Justin Morneau, Baseball) (Steve Nash, Basketball)}

c) Determine the independent and dependent variables.

↳ athlete ↳ Sport

3. State the ***domain*** and ***range*** of the following relations. Indicate whether the relation is also a function.

a) $y = -4x + 7$

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

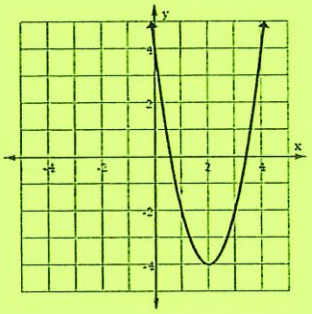
R: $y \in \mathbb{R}$

b) $\{(-3,5),(0,4),(5,-3),(3,3)\}$

D: $\{-3, 0, 3, 5\}$

R: $\{-3, 3, 4, 5\}$

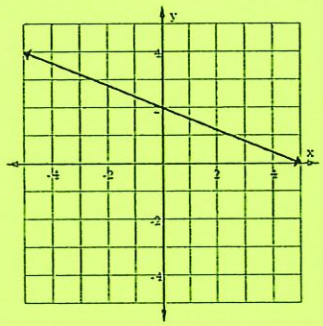
c)



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

R: $y \geq -4$

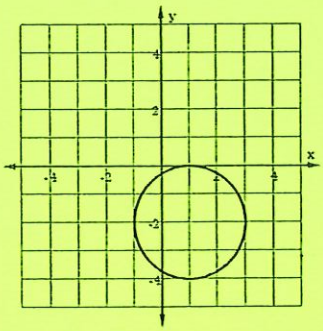
d)



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

R: $y \in \mathbb{R}$

e)



D: $-1 \leq x \leq 3$

R: $-4 \leq y \leq 0$

Representing Linear Relations/Interpreting graphs

* use DESMOS

4. Identify the following as ***linear*** or ***non-linear***. Explain how you know this.

a) $4x^2 + 3 = 6y$

non-linear

doesn't follow pattern $y = mx + b$

b) $5x - 2y = -8$

linear

follows $y = mx + b$

c) $(2,5), (6,10), (10,15)$

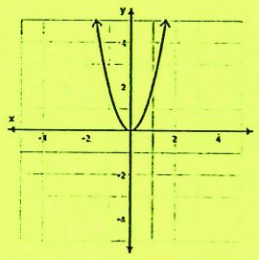
+4 +4

+5 +5

linear

constant increase in x and y

d)



non-linear

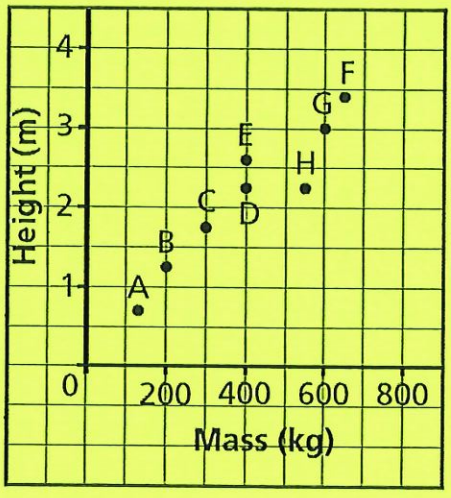
not a line

5. Each point on the graph represents a polar bear. Explain the answer to each question below.

a) Which bear has the greatest mass? What is this mass?

F 650 kg

Heights and Masses of 8 Polar Bears



b) Which bear is the shortest? What is its height?

A

0.7 m

c) Which two bears have the same mass? What is this mass?

D, E

400 kg

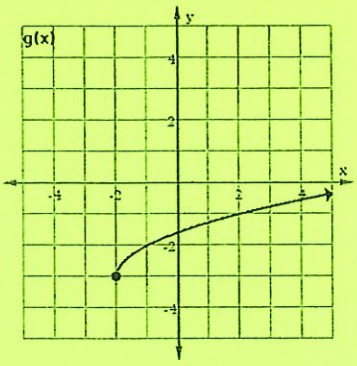
d) Which two bears have the same height? What is this height?

D, H 2.25 m

Function Notation

6. Given the following functions, find:

$f(x) = 5x + 13$



$h(x) = \{(-5, 8), (-4, 7), (3, -9)\}$

a) $f(-4) =$

$f(-4) = 5(-4) + 13$
$= -7$

d) $h(3) =$

$h(3) = -9$

b) $g(2) =$ -1

e) **find** x when $f(x) = 3$

$f(x) = 5x + 13$
$3 = 5x + 13$
$-10 = 5x$
$-2 = x$

c) **find** x when $g(x) = -3$ (y-value)

$x = -2$

f) **find** x when $h(x) = 5$

ϕ

7. Patty lifts weights at the local gym. The equation $M = 5n + 2.5$ represents the mass lifted, M kilograms, when the number of 5-kg masses on the bar is n.

a) Write the equation using function notation.

$M(n) = 5n + 2.5$

b) Find the value of $M(6)$. What does this value represent?

$M(6) = 5(6) + 2.5$
$= 32.5$

↳ mass lifted when there are 6 5-kg masses on the bar

c) Find the value of n when $M(n) = 42.5$. What does this number represent?

$M(n) = 5n + 2.5$
$42.5 = 5n + 2.5$
$40 = 5n$
$8 = n$

8 5kg masses when 42.5 kg are lifted