Lesson 5.1: Representing Relations

Specific Outcome: 4.1 – Identify independent and dependent variables in a given context.

Cartesian Plane - made up of $x-axis$ and $y-axis$
- 0 is the **origin**
- coordinates (points) are written as **ordered pairs** (x, y), where first number is the $x-axis$ reading and second number is the $y-axis$ reading

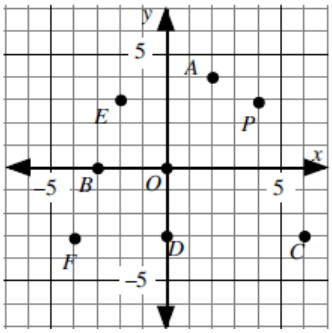
Practice: Write the ordered pair for each point on the graph.

A: **E:**

B: **F:**

C: **0:**

D: **P:**



RELATIONS

- A ***relation*** is *a rule that associates* the elements of one set with the elements of another set.
- A *set* is a collection of distinct objects.
- An *element* of a set is one object in the set.
- 6 ways to represent relations – words, ordered pairs, table of values, arrow diagrams, equations, graphs

Example: The ***profit, P,*** made from a fundraising dance is *associated* with the ***number of tickets, n,*** sold.

- This example shows a relationship between two sets, *P* and *n.*
- Profit, *P*, ***depends*** on n, the number of sold tickets. Therefore, *P* is called the_____ _____, and *n* is called the _____.
- The *independent* variable is also known as the _____, and the *dependent* variable also known as _____.
- Let's assume data has been collected. Complete the other 4 ways to represent it:

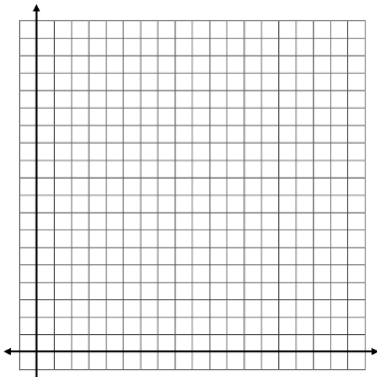
Table of Values:

n	*P*
100	350
200	450
300	550
400	650
500	750

Arrow Diagram:

Ordered Pairs:

Graph



Equation:

INDEPENDENT AND DEPENDENT VARIABLES IN A RELATION

A relation has direction from one set to the other set. In each representation, it matters ***where*** each variable (set) goes!

Table of Values: *independen*t variable is _____

Ordered Pairs: *independent* variable is _____ $(x - values)$

Arrow Diagram: *independen*t variable is _____

Graphs: *independen*t variable is _____

Equation: *independen*t variable is on the side of the equation with the other numbers

For example: $y = 3x - 5$

_____ _____

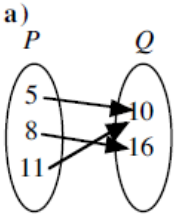
Practice:

1. The diagrams show relations expressed in different ways. In each case

i) state the independent variable **ii)** state the dependent variable

iii) list the inputs **iv)** list the outputs

a)



b)

V	A
4	15
10	12
25	15

c)

(B, c): $(3,7)$, $(4,11)$, $(5,15)$, $(6,19)$

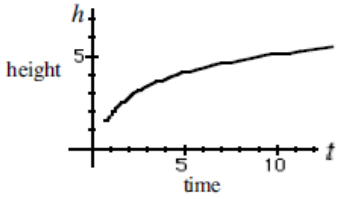
2.

The diagrams show relations expressed in different ways. In each case

i) state the independent variable **ii)** state the dependent variable

a) $C = 2\pi r$

b)



c) The amount of sap, s, obtained from a maple tree is dependent on the time, t, a container is left attached to the maple tree.

HOMEWORK: #1-3, 8, 9

1. Complete the following.

a) The mathematical relationship between two quantities is called a _____ .

b) The variable used for inputs in a relation is known as the _____ variable.

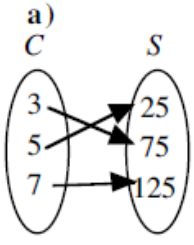
c) The variable used for outputs in a relation is known as the _____ variable.

d) In the equation $A = \pi r^2$, the independent variable is _____, and the dependent variable is _____.

2. The diagrams show relations expressed in different ways. In each case:

i) state the independent and dependent variables **ii)** list the inputs and outputs.

a)



b)

C	n
8	22
20	19
50	35

c)

(f, e): $(2,3)$, $(-2,19)$, $(8,17)$, $(0,2)$

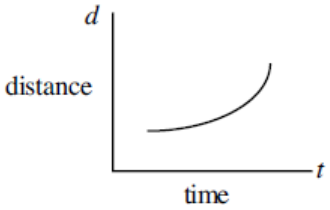
3. For each of the following relations, state

i) the independent variable **ii)** the dependent variable

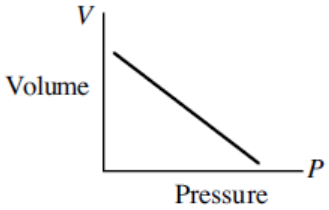
a) $V = \frac{4}{3}\pi r^3$

b) $C = \frac{5}{9}(F - 32)$

c)



d)



e) A truck's value, v, depends on its age, a.

f) The cost, C, of producing business cards is dependent on the number of cards, n, produced.

8. Which of the following statements is false?

A. The dependent variable is represented on the vertical axis of a Cartesian Plane.
B. The independent variable is represented by the first coordinate of an ordered pair
C. The outputs of a relation are shown on the horizontal axis of a Cartesian Plane.
D. The independent variable is usually shown on the right side of an equation.

9. Consider the relation described by the equation $y = 1.5^{x-2}$. If the input is 4, then the output is _____ .

(Record your answer in the numerical response box from left to right)

ANSWER KEY

1. **a)** relation **b)** independent **c)** dependent **d)** r, A

2. **a)** **i)** independent - C; dependent - S **ii)** input - 3, 5, 7; output - 25, 75, 125
b) **i)** independent - C; dependent - n **ii)** input - 8, 20, 50; output - 22, 19, 35
c) **i)** independent - f; dependent - e **ii)** input - 2, –2, 8, 0; output - 3, 19, 17, 2

3. **a)** **i)** independent - r **ii)** dependent - V
b) **i)** independent - F **ii)** dependent - C
c) **i)** independent - time **ii)** dependent - distance
d) **i)** independent - pressure **ii)** dependent - volume
e) **i)** independent - a **ii)** dependent - v
f) **i)** independent - n **ii)** dependent - C

8. C

9.

2	.	2	5