

Algebra — Relations and Functions

Name: _____

Date: _____

Concepts

- Algebra — Relations and Functions
- Finding the Equation of a Linear Function
- Pattern Rule of a Sequence
- The Inverse Variation Function (Inversely Proportional Situation)
- The Modes of Representation of a Relation
- The Rate of Change (a) and the y-Intercept (b)

Algebra — Relations and Functions

1. In each situation below, two quantities change together.

- A skatepark charges \$4 to get in, plus \$2 for every hour you rent a board. You are interested in the total cost of a visit.
- A 300 L water tank is being emptied at a steady 25 L/min. You are interested in how much water is left.
- A hockey team must pay a \$180 tournament fee, shared equally by the players who sign up. You are interested in what each player pays.

For each one, name the **independent** variable and the **dependent** variable, then say whether the relation is a *linear* one or an *inverse variation*, with one sentence of reason.

Finding the Equation of a Linear Function

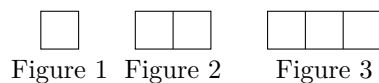
2. A bubble-tea shop delivers to schools. Every order is charged the same delivery fee plus a fixed price per drink.

Number of drinks, x	3	5	8	12
Total cost (\$), y	21.50	32.50	49.00	71.00

- a) Find the rate of change and say what it means here.
- b) Find the y -intercept and say what it means here.
- c) Write the rule of the relation.
- d) What would an order of 20 drinks cost?

Pattern Rule of a Sequence

3. Squares are built in a row out of toothpicks. Neighbouring squares share a toothpick, as shown.



- a) Count the toothpicks in Figures 1, 2 and 3, then give the counts for Figures 4 and 5.
- b) Write the rule giving the number of toothpicks y in Figure n .
- c) How many toothpicks does Figure 40 need?

The Inverse Variation Function (Inversely Proportional Situation)

4. A community centre rents one bus for a ski day at a fixed price of \$360. The passengers split that price equally.

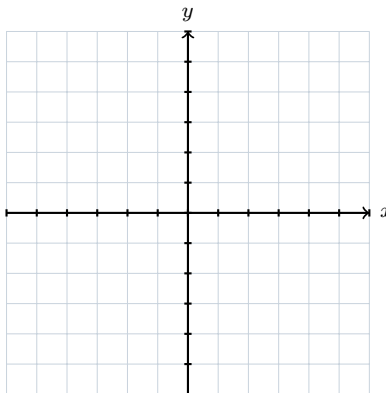
Passengers, x	8	12	18	24	30
Cost per passenger (\$), y	45	30	20	15	12

- Show that this is an inverse variation, and give the constant product.
- Write the rule of the relation.
- How many passengers are needed to bring the cost down to \$9 each?

The Modes of Representation of a Relation

5. Someone leaves the door of a walk-in freezer open. At that moment the temperature inside is -4°C , and it then rises by 2°C every hour.

- Complete a table of values for $x = 0, 1, 2, 3, 4, 5$ hours.
- Plot the points on the grid and join them.
- Write the rule of the relation.
- After how many hours does the freezer reach 0°C ?



The Rate of Change (a) and the y-Intercept (b)

6. A sunflower planted in a school garden is measured on a few Saturdays. Its height grows at a steady rate.

Weeks since planting, x	2	5	6	10
Height (cm), y	17	26	29	41

- a) Find the rate of change a . Careful — the weeks do not go up one at a time.
- b) Find the y -intercept b , and say what it means in this garden.
- c) Write the rule, then use it to predict the height at 15 weeks.

Synthesis — drawing on several sheets in this topic

7. A school team is having T-shirts printed and gets two offers.

Offer A: a \$8 setup charge, then \$3 per shirt.

Offer B: described by this table.

Shirts, x	2	4	7
Total cost (\$), y	14	22	34

- a) Write the rule for each offer.
- b) Which offer is cheaper for 5 shirts?
- c) For how many shirts do the two offers cost exactly the same, and what is that cost?
- d) Which offer should the team choose for a large order? Answer using the rates of change, not by testing numbers.

Want the harder problems and the worked solutions?

The *Challenge Problems* set and the *Answer Keys* for Algebra — Relations and Functions — with the reasoning written out in full — are available at tutorinmontreal.ca.