Rate of Change

- A rate is a comparison of numbers where the second term is 1.
  i.e. Speed in km/h, pay in $/h, or cost in $/kg.
- The line / means to divide! (we also call it "per")
- The units are important, and often tell us what order to divide in.

Ex/ Write the following as a unit rate.

a) Tania earned $67.50 for working for 6 h at a rec centre, what was her hourly rate ($/hr)?

$$\frac{\$67.5}{6\ h} = \$11.25/h$$

b) It costs $4.45 for 5 litres of apple cider, how much does it cost per litre?

order to divide in

$$\frac{\$4.45}{5\ L} = \$0.89/L$$

↑ means divide

- In a linear relation, the difference between any two points on a graph, or in a table, can be used to find the rate. We can also call this the slope.

Ex/ The cost to go to fitness classes at a local gym is a linear relation made up of a sign-up fee and a cost per class. Some information is given in the table below. How much does each class cost?

Number of Classes	Cost ($)
0	50
5	75
10	100
15	150

+5 < > +25

↑ Find the difference between any 2 points

Cost per class

$25 ÷ 5 classes

$= \frac{\$25}{5}$

$= \$5/class$

Ex/ Raj has a card that he uses to buy lunch at school. Each day he spends the same amount. How much does he spend each day?

Number of Days	Amount left on the card ($)
0	40
2	31
4	22
6	13

+2 < > -9

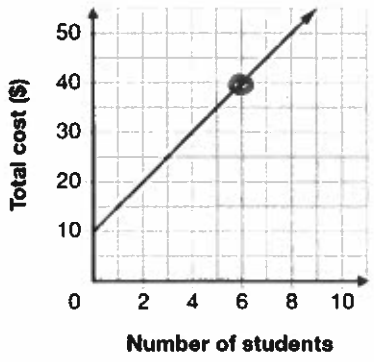
Amount per day

$9 ÷ 2 days

$= \frac{\$9}{2}$

$= \$4.50/day$

Ex/ The graph below shows the relation between the number of students going on a field trip and the cost. How much does it cost per student?



student	cost
0	10
6	40

$6 < \quad > +30$

Find 2 nice (known) values

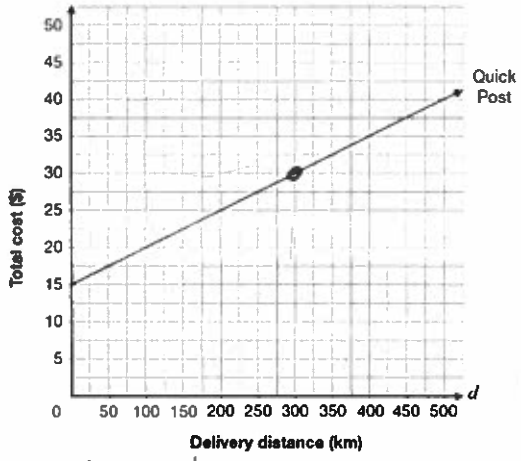
cost per student

$\$30 \div 6$ students

$= \frac{\$30}{6}$

$= \$5$/student

Ex/ The cost of delivering a package with Quick Post is shown by this graph. What is the rate of the line and what does it represent?



Distance	Cost
0	15
300	30

$+300 < \quad > +15$

cost per km

$\$15 \div 300$ km

$= \frac{\$15}{300}$

$= \$0.05$/km

costs $0.05 for every km it goes.

Ex/ There is a linear relationship between the total cost of renting a costume and the number of hours the costume is rented.

- For 3 hours, the total cost is $60.
- For 5 hours, the total cost is $80.

How much is the rental per hour?

h	cost
3	60
5	80

$+2 < \quad > +20$

$\frac{\$20}{2h}$

$= \$10$/hour

Ex/ A bowling alley charges $8 for shoe rental and a per game rate. It costs $26.50 for 5 games, and $34.50 for 9 games.

games	Cost
5	26.50
9	34.50

$4 < \quad > 8$

$= \frac{\$8}{4}$

$= \$2$/game

Practice: Handout - Rate of Change