Secondary 1 Mathematics · Practice Worksheet · tutorinmontreal.ca

Ratios, Rates and Proportions

Name: _____ Date: _____

Concepts

- Ordering Rational Numbers
- Percentages and Directly Proportional Situations
- Proportional Situations (theory)
- Proportions
- Rates
- Rational Numbers ($\mathbb{Q}$)
- Ratios
- Recognizing a Directly or Inversely Proportional Situation
- Solving Directly or Inversely Proportional Situations
- Translating a Situation Into a Ratio or Rate

Ordering Rational Numbers

1. At a Saguenay ski hill, a technician records how each of five snow markers has changed since last week, in centimetres. A positive value means the snow got deeper.

a) Marker A: $+\frac{3}{4}$ Marker B: -1.5 Marker C: $-\frac{1}{2}$ Marker D: $+2.25$ Marker E: $-\frac{9}{4}$

Write the five values in order from least to greatest.

b) Which marker changed the least, that is, which value sits closest to zero?

c) Which markers lost more than 1 cm of snow?

Percentages and Directly Proportional Situations

2. A Secondary 1 class in Trois-Rivières is selling tickets for a spaghetti supper.

a) By Monday evening they had sold 45 tickets, which their teacher says is 15% of the goal. How many tickets is the goal?

b) By Friday they had sold 240 tickets. What percentage of the goal is that?

c) How many more tickets must they sell to reach the goal?

Proportional Situations

3. For each pair of quantities below, decide whether the situation is *proportional* or *not proportional*, and give a one-sentence reason.

a) The number of hockey pucks bought and the total cost, at $4 per puck.

b) A student's age and their height.

c) The number of hours a tap runs at a steady flow and the number of litres it delivers.

d) The side length of a square and its perimeter.

e) The side length of a square and its area.

Proportions

4. To mix her school's team colour, an art teacher uses 5 mL of blue paint for every 8 mL of white paint.

a) She wants to use up a full 200 mL bottle of white. Set up a proportion and find how much blue she needs.

b) How much paint will the finished mixture contain in total?

c) On another day she has only 35 mL of blue left. How much white should she use to get the same colour?

Rates

5. A dépanneur sells the same granola bars in three box sizes:

Box	Bars	Price
Small	6	\$7.20
Medium	10	\$11.50
Large	24	\$28.80

a) Find the unit rate — the price per bar — for each box.

b) Which box gives the best value? Is it the one you expected?

c) How much does a student save by buying 30 bars as three medium boxes rather than as five small boxes?

Rational Numbers ($\mathbb{Q}$)

6. A rational number is any number that can be written as a fraction whose numerator and denominator are integers, with the denominator not zero. Show that each number below is rational by writing it as a fraction in lowest terms.

a) 0.35

b) 6

c) 45%

d) $2\frac{1}{4}$

e) $\frac{18}{24}$

Ratios

7. A community garden in Rosemont divides its plots between vegetables and flowers in the ratio 7 : 3.

a) There are 210 plots in all. How many are vegetable plots and how many are flower plots?

b) Write the ratio of flower plots to vegetable plots.

c) The next spring, 21 flower plots are added and no vegetable plots. Write the new vegetable : flower ratio in simplest form.

Recognizing a Directly or Inversely Proportional Situation

8. For each situation, state whether the two quantities are *directly* proportional, *inversely* proportional, or *neither*, and justify with a calculation or a sentence.

a) Volunteers painting an arena:

Number of volunteers	2	3	6	12
Hours to finish	36	24	12	6

b) The number of litres of gas put in a tank and the amount paid, at a fixed price per litre.

c) The length of one side of a rectangle whose area is fixed at 48 cm^2, and the length of the side next to it.

d) The outdoor temperature and the number of hot chocolates sold at a ski chalet.

Solving Directly or Inversely Proportional Situations

9. A summer camp on Île d'Orléans has enough food to feed 24 campers for 15 days. The food supply is fixed.

a) Are the number of campers and the number of days directly or inversely proportional? Explain in one sentence.

b) Find the constant of the situation and say what it measures.

c) If 40 campers show up instead of 24, how many days will the food last?

Translating a Situation Into a Ratio or Rate

10. For each situation, write the comparison that is asked for, say whether it is a *ratio* or a *rate*, and justify your choice using the units.

a) A bag of trail mix holds 120 g of almonds and 200 g of raisins. Compare almonds to raisins.

b) A coach bus covers 150 km in 2 hours. Compare distance to time.

c) A dance class has 18 girls and 12 boys. Compare the boys to the whole class.

d) A printer produces 45 pages in 3 minutes. Compare pages to minutes.

Synthesis — drawing on several sheets in this topic

11. A bubble-tea shop on rue Wellington records one Saturday. It sold 3 large teas for every 5 small teas, 320 teas in all. A large costs \$6.50 and a small costs \$4.00, and all 320 were served over a 4-hour rush.

a) How many large teas and how many small teas were sold?

b) What percentage of the teas sold were large?

c) What were the shop's total takings for the rush?

d) Express the sales as a rate in teas per hour, and use that rate to say how many teas the shop serves in 15 minutes.

Want the harder problems and the worked solutions?

The *Challenge Problems* set and the *Answer Keys* for Ratios, Rates and Proportions — with the reasoning written out in full — are available at **tutorinmontreal.ca**.