

APPLICATIONS OF RATIONAL EQUATIONS

- [1] The start-up costs for your gluten-free cake business were \$3,000 .
In addition, it costs \$10 to produce each cake.
- [a] What is the average total cost per cake if you produce 200 cakes ?
- [b] To sell the cakes at a reasonable price, you need the average total cost per cake to be \$18 .
How many cakes would you need to produce to achieve that average cost ?
- [2] You and your roommates rent a house for \$2880 per month, and split the rent evenly.
You would like to reduce each roommate's monthly rent.
- [a] If you currently have n roommates, how much is each of you paying ?
- [b] If you take on two additional roommates, each of you would pay \$120 less per month.
How many roommates do you currently have ?

[3] A theatre has 2 exit doors, one smaller and one larger.
Safety rules require that the full theatre must be able to be emptied out in 4 minutes
when both doors are used simultaneously.
If only the smaller door is used, the theatre can be emptied out in 12 minutes.

[a] If only the larger door is used, the theatre can be emptied out in 8 minutes.
Does the theatre meet the safety rules ?
(Consider how much of the theatre empties out every minute.)

[b] In order to meet the safety rules,
how quickly must the theatre be emptied out if only the larger door is used ?

[4] You have 4 hours to make a drive, 45 miles along rural roads with a speed limit of 30 miles per hour,
and 189 miles along highways with a speed limit of 60 miles per hour.

[a] If you drive consistently at the speed limit, how long will it take you to make the drive ?

[b] How fast must you consistently exceed the speed limit in order to make the drive in time ?

Do not staple and do not include the pages above
Show organized and tidy work – difficult to read work will earn no points

Due Mon Oct 14 in class

**NOTE: Part [ii] of problems [A]-[D] must be solved algebraically using a rational equation
(ie. you will not earn points for guess & check)**

- [A] You have \$5040 to spend on ingredients for your gluten-free cakes.
- [i] Your accountant recommends you keep the cost of ingredients for each cake to \$15.
If you follow your accountant's advice, how many cakes can you produce ?
- [ii] You did not follow your accountant's advice. Instead, you bought more luxurious ingredients,
which cost more per cake, so you made fewer cakes.
However, if you had just used cheaper vanilla, you could have saved \$3 per cake,
and produced 30 more cakes.
How much did you spend on ingredients for each cake (using the more expensive vanilla) ?
- [B] Your high school graduating class would like to hold a reunion.
It would cost \$1800 to rent the location and entertainment, plus \$40 per person for food and drinks.
- [i] What is the average cost per person if 120 people attend ?

[ii] How many people would have to attend to make the average cost be \$48 per person ?

[C] You plan to ride your bicycle along a route which is 9 miles uphill, followed by 36 miles downhill. You can ride your bicycle 14 miles per hour on a flat surface. Due to the inclines, riding speed will decrease 2 miles per hour uphill, and increase 4 miles per hour downhill.

[i] How long will it take you altogether to ride the entire route ?

[ii] Your grandmother can complete the route (with the same speed changes) in 2 hours. What is her riding speed on a flat surface ?

- [D] Your cake business has received a very large, very urgent order from a very important client, but you already have plans to take a well-deserved vacation. You decide to subcontract the work out to other local baking companies to complete the order.

Amy's Baking Company can complete the entire order in 24 days,
and Beth's Baking Company can complete it in 12 days.

- [i] If you retain both companies (so they are both baking at the same time),
how long will it take them to complete the order ?
(Consider how much of the order gets completed each day.)

- [ii] The client needs the order completed in 6 days.
Beth's Baking Company just had a huge fire, and is therefore unavailable.
You decide to retain both Amy's Baking Company and Samy's Baking Company, and together
they meet the deadline just in time.
How long would it have taken Samy's Baking Company to complete the entire order alone ?

- [E] A monument with a 35 foot shadow is being photographed by a nearby tourist, who is $5\frac{1}{2}$ feet tall.
If the tourist's shadow is $2\frac{1}{2}$ feet long, how tall is the monument ?