

Name: _____

Date: _____

Math 10/11 Enriched: Section 5.3b (Part2) Applications of Rational Functions

1. Mario can take inventory at the store in 30min. His partner, Carmen, can take inventory in 20min. If they work together, how long will the inventory take?

2. The average cost “A” dollars, of printing the school agenda is given by the equation: $A = \frac{2500 + 1.25n}{n}$, where

“n” is the number printed.

- a) Graph the function $0 \leq n \leq 900$

- b) Determine the average cost when 500 agendas are printed

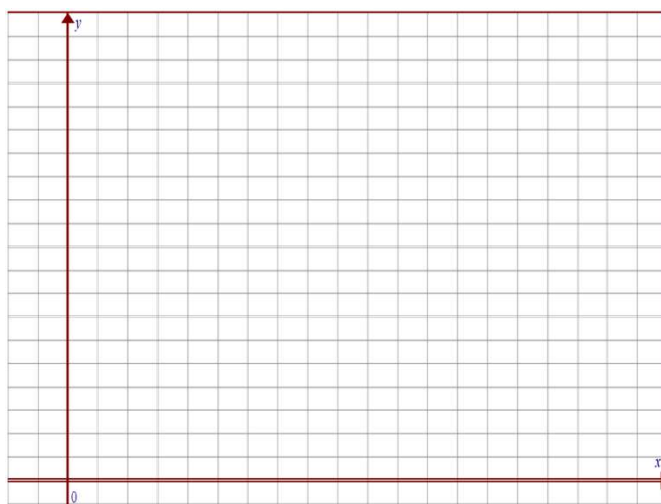
- c) Determine the number of agendas are printed when the average cost is \$8.00?



3. A packaging company makes boxes with sides 16.5cm, and a volume approximately 1050cm^3 . The company plans to redesign the boxes with a smaller base. The boxes must still have a square base and contain the same volume.

- a) Calculate the height of the box

- b) Let “x” centimeters represent the change in the length of the base. Let “h” centimeters represent the change in height. Write “h” as a function of “x”



- c) Graph the Functions on the grid

4. On the way from Vancouver to Seattle, the speed limit is 110km/h. Since the distance between the cities is approximately 230km, a trip between the two cities is about 2.1hours (Excluding border wait time). Cars travelling faster can reach their destination within 2.1 hours.
 - a. Let " s " represent the change in speed compared with 110km/h. Let " t " represent the change in time compared with 2.1hrs. Write " t " as a function of " s "
 - b. How much time will you save driving at 125km/h?
 - c. At what speed does it take to save 10min?
5. An airplane flying at a speed of 280km/hr, at a distance of 900km with a tailwind and then returns the same distance against the wind. The round trip last 7 hours. Let " w " be the speed of the wind.
 - a) Write an equation the total time of the round trip.
 - b) What is the speed of the wind?
 - c) Suppose the windspeed was 100km/hr, what constant speed would he need to fly to make the round trip in 5 hours?
 - d) Let " s " be the flying speed of the plane, " t " for the time of the round trip, and the wind speed $w=100$ km/h. If you graphed " t " as a function of " s ", what does the vertical asymptote represent?
 - e) How much more time will he save if the plane was flying at 500km/hr vs 1000km/hr?
 - f) What does the horizontal asymptote represent?

6. Andrew can deliver 500 handbills in 4h. Amos can deliver the same number in 5h. If they work together, Andrew will start 15minutes before Amos. How long will they take to deliver 500 handbills if they work together?
7. Larry cycled 40 km to the beach. On the way back, he cycled 10km/h slower than on the way out. If the round trip took 6 hours, how fast was he cycling on the way to the beach?
8. On a 42km go-cart course, Andy drives 0.4km/h faster than Sandy. However, Andy has engine problems and uses 30minutes to get it fixed. Andy ends up losing the race to Sandy by 15minutes. How fast did each person drive?
9. A group of hikers need to travel 80km from Camp A to Camp B and then 128km from Camp B to Camp C. It takes two days more to travel from B to C than from A to B. The average speed from A to B is also 3km more than the average speed from B to C. What was the average speed of travel from Camp A to B?
10. If $\frac{x-y}{z-y} = -10$, then what is the value of $\frac{x-z}{y-z} = ?$
11. The average speed of an airplane is five times as fast as the average speed of a train. To travel 2000km, the train requires 20h more than the airplane. Determine the average speeds of the train and the airplane

12. The average speed of an express train is 40km/h faster than the average speed of a bus. To travel 1200km , the bus requires 50% more time than the train. Determine the average speeds of the bus and the train.
13. Bob flew her airplane 500km against the wind in the same time that it took her to fly it 600km with the wind. If wind speed was 20km/h , what was the average speed of the plane?
14. Dave, Mike, and Tracy each can walk at 6km/h . They have one motorcycle, which travels at 90km/h , can accommodate at most two of them at once. Let " t " hours be the time taken for all three of them to reach a point 135km away. Ignoring the time required to start, stop, or change directions, what is the smallest possible value of " t "? (Note: the motorcycle can not drive itself) Fermat
15. Jake drives along a straight road that goes directly from his house (J) to his dad's house (D). Some of this road is on flat ground and some is downhill or uphill. His car travels downhill at 99km/h , on flat ground at 77km/h , and uphill at 63km/h . It takes Jake 3 hours and 40 minutes to drive from (J) to (D). It takes him 4 hours and 20 minutes to drive from "D" to "J". What is the distance between "J" to "D"? Fermat

16. A man wants to get across the other side of a river that is 50meters wide. The river current is travelling downstream at 2.4m/s. The man can run on dry land at 10m/s and swim in still water at 3m/s. His goal is to get to a point directly across the river in the shortest time possible. At what angle should he be swimming against the current to minimize his time?

17. Consider the infinite series:

$$\frac{1}{1} + \frac{1}{1+2} + \frac{1}{1+2+3} + \dots + \frac{1}{1+2+3+4+\dots n} + \dots$$

Determine whether the series converges or diverges. If it diverges, prove that it diverges. If it converges, find the sum of the series. Show all your work.

18. Let $f(x) = \frac{1}{x^3 + 3x^2 + 2x}$. Determine the smallest positive integer “n” such that:

$$f(1) + f(2) + f(3) + f(4) + \dots + f(n) > \frac{503}{2014}$$

19. Let “a”, “b”, and “c” be three different real integers. Prove that

$$\frac{a-b}{1+ab} + \frac{b-c}{1+bc} + \frac{c-a}{1+ca} \neq 0$$