

Dog Mushing Math Problems — Set 1

By Carol Lee Gho

Example 1: If you travel 5 miles in 1 hour you are going 5 miles per hour. $\frac{5 \text{ miles}}{1 \text{ hour}}$

If you travel 20 miles in 2 hours: $\frac{20 \text{ miles}}{2 \text{ hours}} = \frac{10 \text{ miles}}{1 \text{ hour}}$ which is 10 miles per hour

So if you travel 5 miles in 1 hour how many miles per minute do you travel?

$$\frac{5 \text{ miles}}{1 \text{ hour}} \times \frac{1 \text{ hour}}{60 \text{ min}} = \frac{1 \text{ mile}}{12 \text{ min}}$$

I am multiplying by 1, because 1 hour = 60 min. The hours cancel and 5 goes into 5 once and 5 goes into 60 twelve times. So the answer is: 1 mile per 12 minutes or it can be read 12 minutes per 1 mile.

Practice Problems Set A:

1. If you travel to Anchorage which is 360 miles from Fairbanks and it takes you 8 hours, how many miles per hour did you travel? Set up the problem: miles per hour is $\frac{\text{miles}}{\text{hours}} = \frac{360 \text{ miles}}{8 \text{ hours}} = 45 \text{ miles per hour}$.

How many miles per minute is that?

$$\frac{45 \text{ miles}}{1 \text{ hours}} \times \frac{1 \text{ hour}}{60 \text{ min}} = 0.75 \text{ miles per minute}$$

- a. If it took you 6 hours how many miles per hour did you drive? How many miles per minute is that?
- b. If it took you 9 hours how many miles per hour did you drive? How many miles per minute did you drive?

Example 2: 1 hour = 60 minutes 1 minute = 60 seconds

If you walk for 1 hour 20 minutes and 15 seconds How many minutes have you walked? 1 hour = 60 minutes, 20 minutes = 20 minutes and 15 seconds is $\frac{15}{60}$ minutes = 0.25 minutes so: $60 + 20 + 0.25 = 80.25$ minutes.

If you walked for 95.5 minutes how many hours, minutes and seconds is that? To get hours divided 95.5 by 60 and you get 1 hour with 35.5 minutes left, change the .5 into seconds = 30 seconds. So the answer is 1 hour 35 minutes and 30 seconds.

Practice Problems Set B:

1. Change the following minutes into hours, minutes and seconds.
 - a. 75.30 minutes
 - b. 145.45 minutes
 - c. 181.20 minutes

2. Change the following times into minutes:
 - a. 2 hours 10 minutes and 20 seconds
 - b. 1 hour 56 minutes and 40 seconds
 - c. 1 hours and 30 seconds

Practice Problems Set C: Adding hours, minutes and seconds

Add 2 hours 41 minutes 43 seconds and 6 hours 20 minutes 30 seconds. Write in a column:

2 hr. 41 min. 43 sec.

6 hr. 20 min. 30 sec

8 hr. 61 min. 73 sec.

- Add the hours, then add the minutes, then add the seconds. = 8 hours 61 minutes and 73 seconds
- now simplify starting from the right. 73 seconds = 1 min 13 sec. carry the 1 minute to the minutes which leaves 13 sec.
now add the minutes: 41 + 20 + 1 = 62 minutes: 62 minutes = 1 hour and 2 minutes so carry the hour over, then add the hours: 2 + 6 + 1 = 9 hours:

Answer is: 9 hours 2 minutes and 13 seconds

2	105	80		
Subtract: 3 hr.	45 min	20 sec	Borrow 1 min = 60 sec	Borrow 1 hr = 60 min
	<u>1</u> hr.	<u>50</u> min		
		30 sec.		
		1 hr. 55 min		
		50 sec.		

Practice Problems Set C:

Add:	1. a.	b.	Subtract:	2. a.	b.
	2 hr. 35 min. 48 sec	1 hr. 12 min 42 sec		3 hr. 28 min. 3 sec	4 hr. 45 min.
	12 sec.				
	<u>2 hr. 32 min. 12 sec.</u>	<u>1 hr. 50 min 18 sec</u>		<u>1 hr. 40 min. 8 sec</u>	<u>3 hr. 44 min.</u>
	<u>20 sec</u>				

Practice Problems Set D:

1. Mushing fans shook their heads in wonder as Egil Ellis' time was read for the Open North American Sled dog race in 2016. He finished the 27-mile run in 88 minutes, 45.9 seconds with 12 dogs, nearly two minutes faster than the standard he set last year at 90 minutes, 40.1 seconds. With a total time of 207 minutes 13.8 seconds, that's a light-speed average of 3 minutes and 16 seconds a mile for the weekend.
 - a. How many minutes and seconds faster was Ellis' 27-mile run this year compared to last year?
 - b. 3 minutes and 16 seconds per mile is how many miles per hour?
 - c. If Ellis ran the 27-mile run in 88 minutes, 45.9 seconds what was his miles per minute speed? What was his miles per hour speed?

2. George Attla ran the Fur Rondy for the first time in 1958. His first day run was 1 hour 57 minutes and 6 seconds, his second day was 2 hours 3 minutes and 15 seconds and his third day was 2 hours 2 minutes and 57 seconds. The total route was 75 miles.
 - a. What was his total time in hours, minutes and seconds?
 - b. What was his total time in hours and minutes?
 - c. What was his total in hours?
 - d. How many miles per hour did he run?

3. Compare and contrast the speed of Ellis in 2016 and Attla in 1958. Why do you think the speed of Ellis over Attla was so much in 58 years?

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Teacher's Guide & Answers

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Alaska State Standards: Content Standards: Math

6.RP.1, 6.RP.2, 7.RP.1, 7.RP.2: Ratios and Proportional Relationships Understand ratio concepts and use ratio reasoning to solve problems.

6.NS.2, 6.NS.3, 7.NS.2: Apply and extend previous understandings of numbers to the system of rational numbers

Practice Problems Set A:

a. $\frac{360 \text{ miles}}{6 \text{ hr.}} = \frac{60 \text{ miles}}{1 \text{ hr.}} = 60 \text{ miles per hour}$ $\frac{60 \text{ miles} \times \frac{1}{60} \text{ hr}}{1 \text{ hr.}} = \frac{1 \text{ mile}}{60 \text{ min}} = 1 \text{ mile per min.}$

b. $\frac{360 \text{ miles}}{9 \text{ hours}} = 40 \text{ miles per hour}$ $\frac{40 \text{ miles}}{1 \text{ hr}} \times \frac{1 \text{ hr}}{60 \text{ min}} = \frac{2 \text{ miles}}{3 \text{ min}} = 2/3 \text{ miles per min.}$

Practice Problems Set B:

- $75.3 \text{ min} = 1 \text{ hr } 15 \text{ min } 18 \text{ sec.}$ ($75/60 = 1 \text{ hr.} 15 \text{ min}$) $.3 \text{ min} = 3/10 \times 60 = 18 \text{ sec.}$
 - $145.45 \text{ min} = 2 \text{ hr. } 25 \text{ min } 27 \text{ sec}$ ($145/60 = 2 \text{ hr. } 25 \text{ min}$) $.45 \text{ min} = 45/100 \times 60 = 27 \text{ sec.}$
 - $181.2 \text{ min} = 3 \text{ hr. } 1 \text{ min. } 12 \text{ sec}$ ($181/60 = 3 \text{ hr. } 1 \text{ min}$) $.2 \text{ min} = 2/10 \times 60 = 12 \text{ sec.}$
- $2 \text{ hr. } 10 \text{ min } 20 \text{ sec} = 130.33 \text{ min}$ ($2 \text{ hr} \times 60 + 10 = 130 \text{ min}$) $+ 20 \text{ sec} = 20/60 = .33 \text{ min}$
 - $1 \text{ hr. } 56 \text{ min } 40 \text{ sec} = 116.67 \text{ min}$ ($1 \text{ hr} \times 60 \text{ min} + 56 \text{ min}$) $+ 40/60 = 2/3$ or $.67 \text{ min}$
 - $1 \text{ hr. } 30 \text{ sec.} = 60.5 \text{ min}$ ($1 \text{ hr} = 60 \text{ min}$) $+ 30 \text{ sec} = 30/60 = 1/2 = .5$

Practice Problems Set C:

- $4 \text{ hr. } 67 \text{ min. } 60 \text{ sec} = 5 \text{ hr. } 8 \text{ min}$
 - $2 \text{ hr. } 62 \text{ min } 60 \text{ sec} = 3 \text{ hr. } 3 \text{ min. } 0 \text{ sec.}$
- $1 \text{ hr. } 47 \text{ min. } 55 \text{ sec.}$
 - $1 \text{ hr. } 0 \text{ min } 52 \text{ sec.}$

Practice Problems Set D:

1. a.
$$\begin{array}{r} 89 \quad 100.1 \\ 90 \text{ min. } 40.1 \text{ sec.} \\ \underline{88 \text{ min } 45.9 \text{ sec}} \\ 1 \text{ min. } 54.2 \text{ sec.} \end{array}$$
 Borrow 1 min (1 min = 60 sec) add to the sec. to get 100.1

b. about 18 miles per hour $3 \frac{16}{60} = 3.27$ miles per minute

$$\frac{1 \text{ mile}}{3.27 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr.}} = \frac{60 \text{ miles}}{3.27 \text{ hr.}} = 18.35 \text{ miles per hour rounded to 18 miles per hour}$$

c. $88 \text{ min. } 45.9 \text{ sec.} = 88 \frac{45.9}{60} = 88.765 \text{ min.}$ $\frac{27 \text{ mile}}{88.765 \text{ min}} \times \frac{60 \text{ min}}{1 \text{ hr.}} = \frac{1620 \text{ miles}}{88.765 \text{ hr.}} = 18.25 \text{ mph}$

2. a. 6 hr. 3 min 18 sec.

b. 6 hr. 3.3 min.

c. 6.055 hr.

d. $75 \text{ miles}/6.055 \text{ hr.} = 12.39 \text{ miles per hour or about 12 miles per hour}$

3. This will lead to a nice discussion: dogs bred for speed instead of trapping, food supplements, more practice, etc.