

Day 3 - Characteristics in the Real World - Practice

1. The Sandia Peak Tramway in Albuquerque, New Mexico, travels a distance of about 4500 meters to the top of Sandia Peak. Its speed is 300 meters per minute. The function $f(x) = 4500 - 300x$ gives the tram's distance in meters from the top of the peak after x minutes. Find and interpret the intercepts from the table below.

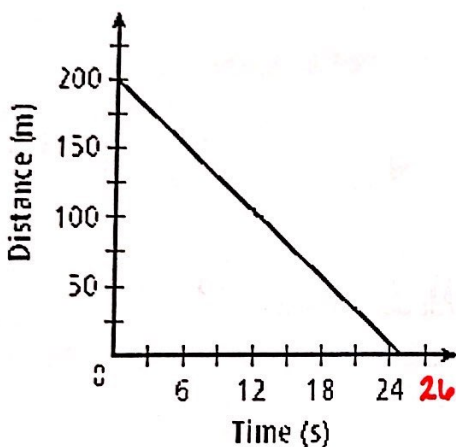
x minutes	0	2	5	10	15
$f(x) = 4500 - 300x$ distance from top	4500 y-int	3900	3000	1500	0 x-int

x-int: when the tram first began, it was 4500 meters from the top

y-int: At 15 minutes, the tram reached the top of the peak.

2. Trish can run the 200 meter dash in 25 seconds. The function $f(x) = 200 - 8x$ gives the distance remaining to run after x seconds.

Trish's 200-Meter Dash



a. What is the domain & range of the function?

Domain: $0 \leq x \leq 25$ seconds

Range: $0 \leq y \leq 200$ meters

b. What is the slope of the function? Explain what the slope means in terms of the problem scenario.

$$\frac{-200 \text{ meters}}{25 \text{ seconds}} = \frac{-8 \text{ meters}}{1 \text{ second}}$$

She runs 8 meters every second

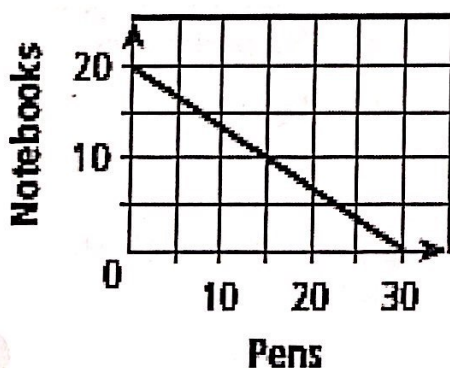
c. What are the x and y intercepts? Explain what they mean in terms of the problem scenario?

$(25, 0)$: It took Trish 25 seconds to complete the race

$(0, 200)$: At 0 seconds, Trish had 200 meters to run

3. The school store sells pens for \$2.00 and notebooks for \$3.00. The equation $2x + 3y = 60$ describes the number of pens x and notebooks y that you can buy for \$60.

School Store Purchases



a. What is the domain and range of the function?

Domain: $0 \leq x \leq 30$ pens

Range: $0 \leq y \leq 20$ notebooks

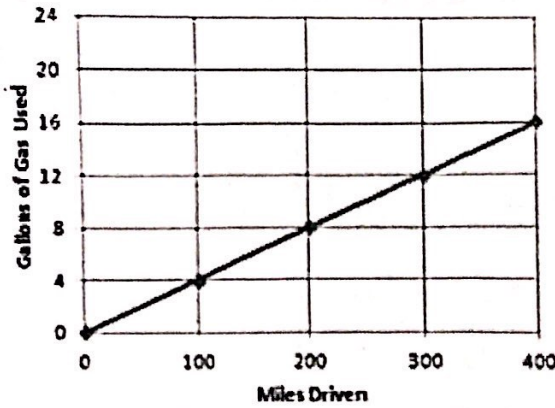
b. What are the x and y intercepts? Explain what they mean in terms of the problem scenario?

$(30, 0)$: If you buy 30 pens, you can't buy any notebooks

$(0, 20)$: If you buy 20 notebooks, you can't buy any pens

4.

Gallons of Gas Used



a. What is the domain in context of the problem?

$$0 \leq x \leq 400 \text{ miles}$$

b. What is the range in context of the problem?

$$0 \leq y \leq 16 \text{ gallons}$$

c. How many miles per gallon does this car get?

$$\frac{400 \text{ miles}}{16 \text{ gallons}} = 25 \text{ miles per gallon}$$

5. A fishing lake was stocked with 300 bass. Each year, the population decreases by 25 bass. The population of bass in the lake after x years is represented by the function $f(x) = 300 - 25x$. Calculate the x and y intercepts and then interpret them in terms of the problem scenario.

a. What are the x and y intercepts? Explain what they mean in terms of the problem scenario.

$$\begin{aligned} x\text{-int} \rightarrow y &= 0 \\ 0 &= 300 - 25x \\ 25x &= 300 \\ x &= 12 \text{ years} \end{aligned}$$

At 12 years, there will be 0 bass in the lake.

$$\begin{aligned} y\text{-int} \rightarrow x &= 0 \\ f(0) &= 300 - 25(0) \\ f(0) &= 300 \text{ bass} \end{aligned}$$

There were 300 bass to start

b. What is the domain of the function?

$$\begin{aligned} \# \text{ of years} \\ 0 \leq x \leq 12 \text{ years} \end{aligned}$$

c. What is the range of the function?

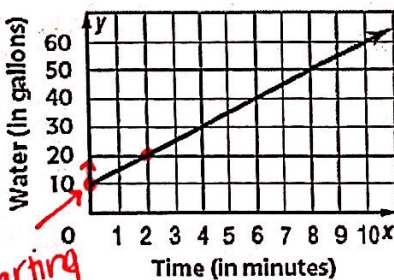
$$\begin{aligned} \# \text{ of bass remaining} \\ 0 \leq y \leq 300 \text{ bass} \end{aligned}$$

d. What is the slope of the function? Explain what the slope means in terms of the problem scenario.

$$-25 \rightarrow \text{The lake decreases by 25 bass every year}$$

6. Ryan is adding water to his swimming pool. The graph below shows the amount of water in the pool as more water is added. How fast is Ryan adding water to the pool? How many gallons were in the pool to start?

WATER IN POOL



Starting point

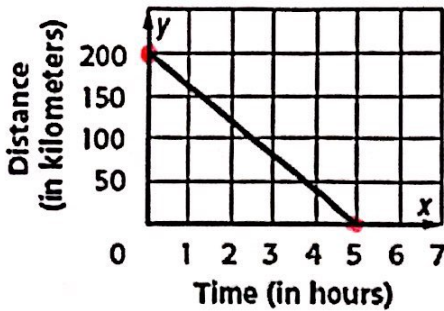
• There were 10 gallons to start.

$$\frac{10 \text{ gallons}}{2 \text{ min}} = \frac{5 \text{ gallons}}{1 \text{ min}}$$

Pool fills 5 gallons per minute

7. Frank is planning to drive his car on the Overseas Highway, the scenic road that connects the islands in the Florida Keys to the Florida mainland. Calculate the slope and y-intercept and interpret what they mean according to the problem scenario.

DISTANCE TO BE TRAVELED



y-int: (0, 200)
hours Km

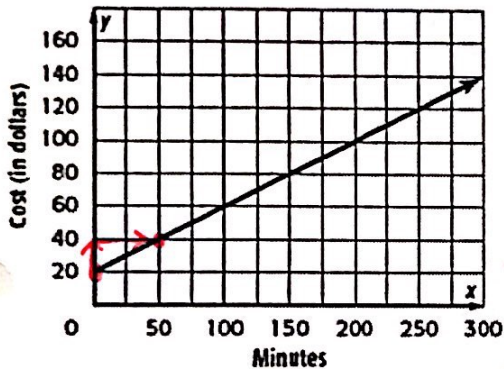
In the beginning, you are 200 km away

Slope: $-\frac{200 \text{ km}}{5 \text{ hours}} = -\frac{40 \text{ km}}{1 \text{ hour}}$

You travel 40 km closer to your destination every hour.

8. The graph below represents Sarah's monthly phone charge; a monthly fee plus a charge for each minute she uses her phone. How much is the monthly fee and how much does she pay per minute?

MONTHLY PHONE CHARGE



The monthly fee is \$20.

Cost per minute:

$$\frac{\$20}{50 \text{ min}} = \$0.40 \text{ per minute}$$

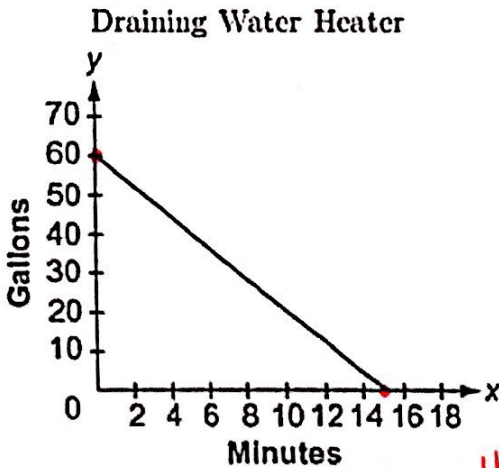
9. The cost to ship a package in the mail includes a basic shipping charge plus an additional cost per number of pounds the package weighs. A three pound package costs \$6.30 to ship. A ten pound package costs \$14 to ship. What is the cost per pound and what is the basic shipping charge? (Hint: make a table)

0	3.00
1	4.10
2	5.20
3 pound	6.30
4	7.40
5	8.50
6	9.60
7	10.70
8	11.80
9	12.90
10 pound	14.00

$$\frac{14.00 - 6.30}{10 - 3} = \frac{7.70}{7} = \$1.10 \text{ per pound}$$

It costs \$1.10 per pound to ship a package. The basic shipping fee is \$3.00.

10. Water is draining from a hot water heater:



a. What is the domain?

$0 \leq x \leq 15$ minutes

b. What is the range?

$0 \leq y \leq 60$ gallons

c. What is the slope (simplified and labeled)?

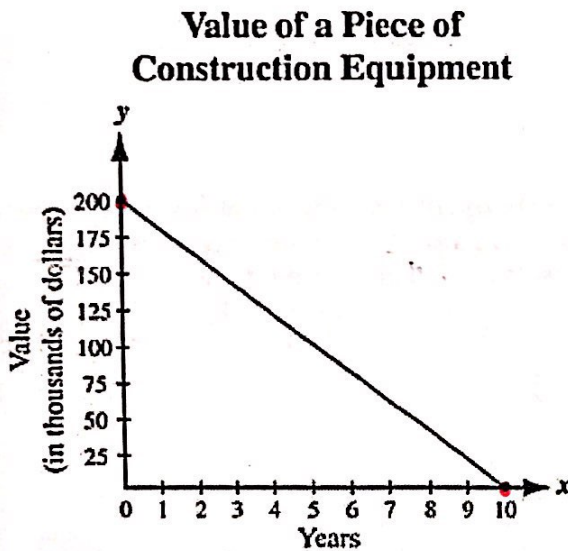
$\frac{-60 \text{ gallons}}{15 \text{ minutes}} = -4 \text{ gallons per minute}$

d. What are the x and y intercepts? Interpret this in terms of the problem scenario.

y-int: (0, 60) There were 60 gallons to start.

x-int: (15, 0) It took 15 minutes to drain the heater.

11. The value of a piece of construction equipment as it depreciates:



a. What is the domain?

$0 \leq x \leq 10$ years

b. What is the range?

$0 \leq y \leq \$200,000$

c. What is the slope (simplified and labeled)?

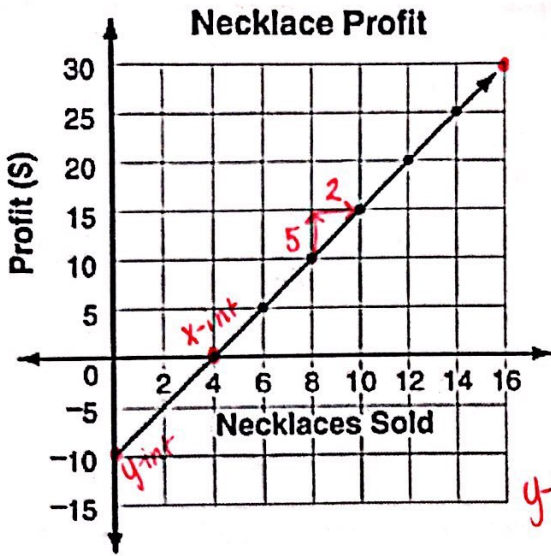
$\frac{-200,000}{10 \text{ years}} = \frac{-\$20,000}{1 \text{ year}}$ Equipment loses \$20,000 of value every year.

d. What are the x and y intercepts? Interpret this in terms of the problem scenario.

y-int: (0, 200) : The equipment is worth \$200,000 when brand new.

x-int: (10, 0) : It takes 10 years for the equipment to lose all of its value.

12. Amount of profit Julia makes from selling necklaces (assume Julie has no more than 16 necklaces to sell):



a. What is the domain?

$0 \leq x \leq 16$ necklaces

b. What is the range?

$-10 \leq y \leq 30$

c. What is the slope (simplified and labeled)?

$\frac{\$5}{2 \text{ necklaces}} = \$2.50 \text{ profit for every necklace sold}$

d. What are the x and y intercepts? Interpret this in terms of the problem scenario.

y-int (0, -10) If she doesn't sell any necklaces, she loses \$10.

x-int (4, 0) She has to sell 4 necklaces to break even

13. Time spent mowing and the amount of gas remaining in the lawn mower:

Time Spent Mowing (hours)	Gas in Lawn Mowers (gallons)
0	110
24	80
48	50
72	20
88	0

a. What is the domain?

$0 \leq x \leq 88$ hours

b. What is the range?

$0 \leq y \leq 110$ gallons

c. What is the slope (simplified and labeled)?

$\frac{-110 \text{ gallons}}{88 \text{ hours}} = \frac{-1.25 \text{ gallons}}{1 \text{ hour}}$ You use 1.25 gallons of gas every hour

d. What are the x and y intercepts? Interpret this in terms of the problem scenario.

y-int: (0, 110): There are 110 gallons of gas to start.

x-int: (88, 0): It took 88 hours to use all of the gas.