Practice Work Sample Problems

$y = mx + b$

A.CED.1, F.BF.1a, F.LE.5, or S.ID.7

1. A caterer charges $120 to cater a party for 15 people and $200 for 25 people. Assuming that the cost is a linear function of the number of people. Write an equation to represent the cost a party based on the number of people, explain what the slope and y-intercepts represents in the context of the problem, and then determine how much a party for 40 people would cost.

Find an equation for the cost of a party and explain what the slope & y-intercepts mean then find the cost for a party for 40 people.

$(15, 120)$ $(25, 200)$

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{200 - 120}{25 - 15} = \frac{80}{10} = 8$$

Slope = 8

This means the company charges $8.00 per person

$y - y_1 = m(x - x_1)$

$y - 120 = 8(x - 15)$

$y - 120 = 8x - 120$

$+120 \quad +120$

$y = 8x$

y-intercept = 0

This means the company does not have a flat fee that they charge

Find y when $x = 40$

$y = 8(40)$ $y = \$320$

A party for 40 people would cost $320.00

* this problem is a bit more difficult than the work sample will be.

* 2. The water level of a river was 34 feet on June 1st. One June 30th the water level was 19 feet. Write an equation to represent the water level, explain what the slope and y-intercepts represent in the context of the problem, and then determine how many days it will take for the water level to be at its minimum of 15 feet.

Find an equation to represent water level and explain the slope and y-intercept, then find the number of days required for the river level to be a minimum of 15ft.

$(1, 34)$ $(30, 19)$

$$m = \frac{19-34}{30-1} = \frac{-15}{29} = -0.5172413793$$

$m \approx -0.52$

This means the river level is dropping by about 0.52 feet per day

$$y - y_1 = m(x - x_1)$$

$$y - 34 = -0.52(x - 34)$$

$$y - 34 = -0.52x + 17.68$$

$+34 \qquad +34$

$$y = -0.52x + 51.68$$

y-intercept = 51.68

This means the river started with about 51.68 feet of water

Find x when $y = 15$

$$15 = -0.52x + 51.68$$

$-51.68 \qquad -51.68$

$$-36.68 = -0.52x$$

$$\frac{-36.68}{-0.52} = \frac{-0.52x}{-0.52}$$

$$70.53846154 = x$$

$x \approx 70.5$ day

It will take about 70.5 days for the water level to be 15ft

$y = mx + b$

3. A bus company took a tour bus on the ferry when there were 30 people aboard. The ferry charged the bus company $180. The following week, the bus had 50 people on board and the ferry charged them $220. Write an equation to represent the cost of the ferry based on the number of people on the bus, explain what the slope and y-intercepts represent in the context of the problem, and then determine what it will cost for a bus with 40 people on board.

write an equation for the cost of the ferry and explain it. Find the for 40 people.

$(30, 180)$ $(50, 220)$

x_1 y_1

$$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{220 - 180}{50 - 30} = \frac{40}{20} = 2$$

$$y - y_1 = m(x - x_1)$$

$$y - 180 = 2(x - 30)$$

$$y - 180 = 2x - 60$$

$$+180 \qquad +180$$

$$y = 2x + 120$$

Slope = 2
This means the ferry Company charges $2.00 per person.

y-intercept = 120
This means the ferry Company charges $120 for an empty bus

Find y when $x = 40$

$$y = 2(40) + 120$$

$$y = 80 + 120$$

$$y = \$200$$

For 40 people the cost is $200.00

4. Last year Ms. Brown rented a banquet hall for $150.00 to celebrate the end of the school year with 30 teachers from around the valley. This year that same banquet hall will charge her $270.00 for the 70 teachers that will be attending. Write an equation to represent the cost of the banquet hall based on the number of people attending, explain what the slope and y-intercepts represent in the context of the problem, and then determine what it will cost for a party with 50 teachers attending.

Find an equation to represent the cost of the banquet hall, explain the slope & y-intercept, and then Find the cost for a party with 50 teachers.

$(30, 150)$ $(70, 270)$

$$m = \frac{270 - 150}{70 - 30} = \frac{120}{40} = 3$$

Slope = 3 This means the banquet hall charges $3.00 per teacher

$y - y_1 = m(x - x_1)$

$y - 150 = 3(x - 30)$

$y - 150 = 3x - 90$

$+150 \quad +150$

$y = 3x + 60$

y-intercept = 60
this means the banquet hall has a flat (base) fee of $60.00 to use their facility

Find y when $x = 50$

$y = 3(50) + 60$

$y = 150 + 60$

$y = 210$

It will cost $210.00 for a party with 50 teachers

* For these problems I am only showing the work and answers. You add the sentences/extra information

1. A climber is on a hike. After 2 hours he is at an altitude of 400 feet. After 6 hours, he is at an altitude of 700 feet. Find the average rate of change, write an equation to model this data, and explain the meaning of the y-intercept in the context.

(2, 400) (6, 700)

$m = \frac{700-400}{6-2} = \frac{300}{4} = 75$

$y - 400 = 75(x-2)$

$y - 400 = 75x - 150$

$+400 \quad +400$

$y = 75x + 250$

Slope = 75
This means he is increasing in altitude 75 feet per hour

y-intercept = 250
This means he started his hike at an altitude of 250ft

* 2. A scuba diver is 30 feet below the surface of the water 10 seconds after he entered the water and 100 feet below the surface after 40 seconds. Find the scuba divers rate of change, write an equation to model this data, and explain the meaning of the y-intercept in the context.

* Harder than a typical work sample due to Fractions

(10, 30) (40, 100)

$m = \frac{100-30}{40-10} = \frac{70}{30} = \frac{7}{3} \approx 2.\overline{3}$

$y - 30 = \frac{7}{3}(x-10)$

$y - 30 = \frac{7}{3}x - \frac{70}{3}$

$+30 \quad +30$

$y = \frac{7}{3}x + \frac{20}{3}$

$-\frac{70}{3} + \frac{30}{1} \cdot \frac{3}{3} =$

$-\frac{70}{3} + \frac{90}{3} = \frac{20}{3}$

Slope = $\frac{7}{3} \approx 2.\overline{3}$
This means the water depth is increasing by about 2.3 feet per second

y-intercept = $\frac{20}{3} \approx 6.\overline{6}$
This means the scuba diver started at 6.6 ft below the water

3. A rocket is 1 mile above the earth in 30 seconds and 5 miles above the earth in 150 seconds. Find the rockets rate of change in miles per second, write an equation to model this data, and explain the meaning of the y-intercept in the context.

(30, 1) (150, 5)

$m = \frac{5-1}{150-30} = \frac{4}{120} = \frac{1}{30} \approx 0.0\overline{3}$

$y - 1 = \frac{1}{30}(x-30)$

$y - 1 = \frac{1}{30}x - 1$

$+1 \quad +1$

$y = \frac{1}{30}x$

Slope = $\frac{1}{30} \approx 0.0\overline{3}$
This means the rocket is rising about $0.0\overline{3}$ feet per second

y-intercept = 0
This means the rock starts zero feet above the ground

4. A teacher weighed 145 lbs when she started teaching and now weighs 190 lbs after teaching for 20 years. Find the rate of change in weight, write an equation to model this data, and explain the meaning of the y-intercept in the context.

(0, 145) (20, 190)

$m = \frac{190-145}{20-0} = \frac{45}{20} = 2.25$

$y - 145 = 2.25(x-0)$

$y - 145 = 2.25x$

$+145 \qquad +145$

$y = 2.25 + 145$

The slope = 2.25
This means the teacher gained about 2.25 lbs per year

y-intercept = 145
This means the teacher started at 145 lbs

5. The year after Linda purchased her house it was worth $144,000. Ten years later the house is worth $245,000. Find the average annual rate of change in dollars per year in the value of the house. Explain what you answer means.

Find the slope between (1, 144,000) and (10, 245,000)

$m = \frac{y_2 - y_1}{x_2 - x_1} = \frac{245,000 - 144,000}{10 - 1} = \frac{101,000}{9} = 11222.\overline{22}$

$m = \$11,222.22$

Between 1 and 10 years average annual rate of changes is $11,222.22.

6. Michael started a savings account with $310. After 4 weeks, he had $350 dollars, and after 9 weeks, he had $400. Find the rate of change of money in his savings account per week, write an equation to model this data, and explain the meaning of the y-intercept in the context.

(0, 310) (4, 350) (9, 400)

$m = \frac{350-310}{4-0} = \frac{40}{4} = 10$

$y - 310 = 10(x-0)$

$y - 310 = 10x$

$+310 \qquad +310$

$y = 10x + 310$

Slope = 10
This means he is saving $10.00 per week

y-intercept = 310
This means he started with $310.00 in his account

Solving Linear Inequalities A.CED. 1

1. Peter must write an essay with more than 500 words for his English class. So far, he has written 245 words. Write and solve an inequality to find how many more words Peter needs to write for his essay?

$>$

$x = \#$ of words

$x + 245 > 500$

$-245 \quad -245$

$x > 255$

Peter must write more than 255 words

2. Monroe needs more than 45 cubic feet of soil to fill the planter he built. Each bag of soil contains 2.5 cubic feet. Write and solve an inequality to find how many bags of soil Monroe will need.

$>$

$x = \#$ of bags needed

$\frac{2.5x}{2.5} > \frac{45}{2.5}$

$x > 18$

Monroe needs more than 18 bags

$< \quad > \quad \leq \quad \geq$

3. Jason's class is having a car wash to raise money for a project. They want to raise at least $120, and they are charging $5 to wash a car. Write and solve an inequality to find how many cars must be washed to raise at least $120.

Find how many cars Jason must wash to raise $120.00

x = # of cars needed to wash

$$\frac{5x}{5} \geq \frac{120}{5} \qquad 5x + 60 \geq 120$$

$$x \geq 24$$

Jason must wash at least 24 cars to make at least $120.00.

Possible Bonus check $5 \cdot 24 \geq 120$

4. Kendra wants to buy some goldfish for her fish tank. She can spend no more than $18, and the fish cost $3 each. Write and solve an inequality to find how many goldfish Kendra can buy.

x = # of goldfish

$$\frac{3x}{3} \leq \frac{18}{3}$$

$$x \leq 6$$

Kendra can buy 6 or less fish