**Please solve as follows:**

   o For noninteger answers, please write your answer as a fraction rather than a decimal.

 To show your work, you will need to include

         o the algebra used to compute the solution to any equations.   
         o the formula with substituted values.   
         o the final calculated answer with units.

1. Solve . You must show all work to receive full credit.

Show work here: First I simplify:

2(x + -4) = 2[x + -3(x + -1) + 2]

Then reorder:

2(-4 + x) = 2[x + -3(x + -1) + 2]

(-4 \* 2 + x \* 2) = 2[x + -3(x + -1) + 2]

(-8 + 2x) = 2[x + -3(x + -1) + 2]

-8 + 2x = 2[x + -3(-1 + x) + 2]

-8 + 2x = 2[x + (-1 \* -3 + x \* -3) + 2]

-8 + 2x = 2[x + (3 + -3x) + 2]

Reorder the terms:

-8 + 2x = 2[3 + 2 + x + -3x]

Combining like terms:

3 + 2 = 5

-8 + 2x = 2[5 + x + -3x]

Combining like terms:

x + -3x = -2x

-8 + 2x = 2[5 + -2x]

-8 + 2x = [5 \* 2 + -2x \* 2]

-8 + 2x = [10 + -4x]

Solving for X

-8 + 2x = 10 + -4x

First I move all terms X to left and the rest to the right:

Add '4x' to each side of the equation.

-8 + 2x + 4x = 10 + -4x + 4x

Combine like terms: 2x + 4x = 6x

-8 + 6x = 10 + -4x + 4x

Combine like terms: -4x + 4x = 0

-8 + 6x = 10 + 0

-8 + 6x = 10

Add '8' to each side of the equation.

-8 + 8 + 6x = 10 + 8

Combine like terms: -8 + 8 = 0

0 + 6x = 10 + 8

6x = 10 + 8

Combine like terms: 10 + 8 = 18

6x = 18

Divide each side by '6'.

x = 3

Final Answer: X=3

2. Solve . You must show all work to receive full credit.

Show work here:

Final Answer:

3. The cell phone service for the CEO of a small company is $39.99 a month plus $0.10

per minute for long distance. In a month when the company’s phone bill was $75.19,

how many minutes of long distance did the CEO use? Set up an equation and solve.

Show all work to receive full credit.

Equation:

Show work here:

Final Answer:

4. The equation  represents the formula for total distance traveled. The distance

traveled, *d*, is equal to the rate of travel, *r*, multiplied by the time of travel, *t*. Use this

formula to help solve the following problem.

Two runners, Jay and Ben, start at the same time from opposite ends of an 8-mile jogging trail and begin running toward each other. Jay is running at the rate of 5 mph, and Ben is running at a rate of 7 mph. How long, in minutes, after they start will Jay and Ben meet?

1. Who will have traveled the longer distance?

Answer:

1. When they meet, what is the combined distance Jay and Ben will have traveled?

Answer:

1. What equation represents this situation?

Answer:

1. Solve the equation; show work your here:

Answer:

1. How long, in minutes, did it take for Jay and Ben to meet?

Answer:

5. Solve the following two equations separately:  and 

Show work for solving  here:

Show work for solving  here:

Explain the difference between the two solutions; it must be detailed to receive full credit:

Answer:

6. A clothing store may reduce the regular price of a product because the clothes are damaged, odd sizes, or discontinued items. The *discount*, or markdown, is the amount by which the store reduces the regular price of a product. The percent discounted is called the *discount rate* and is usually expressed as a percent of the original selling price. Taking the regular price and subtracting the discount calculates the sale price. The formula  can be used to help find the sale price. The sale price, *S*, is equal to the regular price, *R*, minus the discount rate, *r*, multiplied by the regular price, *R* (Aufmann, Vernon, & Lockwood, 2006).

Using the aforementioned information, solve the following problems.

1. A pair of shoes that are currently selling for a price of $89.99 are going to be marked down 20% for the spring sale. Use the sale price formula to find the new

price of the shoes. Round to the nearest cent.

Set up equation:

Show work here:

Sale price of shoes:

B. A suit coat that is marked down 35% has a sale price of $292.50. Use the sale price

formula to find the regular price of the suit coat. Round to the nearest cent.

Set up equation:

Show work here:

Regular price of the suit coat:

C. Using the formula , find another formula that represents the discount

rate. (Hint: Solve for *r*.)

Discount rate formula:

D. A prom dress with a regular price of $395 is on sale for $280. Find the discount rate;

round to the nearest tenth of a percent.

Show work here:

Discount rate:

2

1. The following table shows the number of hours five car salespeople worked and the number of cars they sold. Using Excel, plot each point on the same graph where the first coordinate is the number of hours and the second coordinate is the number of cars sold (*hours, cars*). After plotting each point, explain if there is a linear relationship between the number of hours worked and the number of cars sold.

|  |  |  |
| --- | --- | --- |
| Sales | Hours Worked | Cars  Sold |
| Tim | 40 | 3 |
| Bob | 26 | 5 |
| Brandi | 10 | 1 |
| Kurt | 60 | 1 |
| Kelly | 30 | 7 |

Graph:

Explanation of linear relationship:

2. Graph the following equations.

A. 

Graph:

B. 

Graph:

3. Answer the following questions pertaining to the following graph.

A. Give a brief explanation describing the graph in terms of its *x*-axis and *y*-axis.

B. In what year was the number of sales the highest?

C. Find the slope of the line. Show all work to receive full credit.

D. Write a sentence that explains the meaning of the slope within the context of this problem.

E. Find the equation of the line that represents the number of book sales. Show all work

to receive full credit.

F. Interpret the *y*-intercept of this equation.

4. For a 2-day rental, a rental car agency charges a $40 fee per day plus $0.35 per mile.

The equation  represents this model, where *C* symbolizes the total cost of

the rental, and *x* stands for the number of miles driven.

A. Find the *y*-intercept of this graph and explain what it means in the context of the problem. Show all work to receive full credit.

B. Explain the slope of the line within the context of this problem.

C. Graph the equation.

5. The director of a summer day camp estimates that 120 children will join if the camp

fee is $250, but for each $25 decrease in the fee, five more children will enroll.

A. Determine the linear equation that will represent the number of children who will enroll at a given fee. **Hint:** To write the slope, you need two points on the line. Show all work to receive full credit.

B. Graph the linear equation that represents the number of children who will enroll at a given fee.

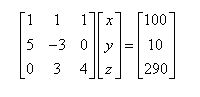
C. Approximately how many students will enroll if the camp fee is $190? Round to the nearest child. Show all work to receive full credit.

D. Approximately how many students will enroll if the camp is free? Round to the nearest child. Show all work to receive full credit.

The number of arrests y of a city over a period of time x is graphed on a rectangular coordinate system. Write a paragraph describing your interpretation when the slope is positive, zero, and negative. If you were buying a home in this particular city, which slope would be most attractive to you and why?

3

From the following augmented matrix, first write the system of equations that represents the augmented matrix and then create a real-world word problem that would represent these equations and their unknowns. Be creative. Do not use word problems that are in the assignments or course material.



1. To raise money, the local baseball teams decided to sell team logo hats (H) and T-shirts (T). The league director decided to hold a contest among the teams to see which team can raise the most money. The contest lasted for 3 weeks. Here are the results of the first 2 weeks. The numbers represent the number of hats and T-shirts sold.

H T

H T

Bears

Chargers

Tigers

Blue jays

*Week 2*

*Week 1*

Bears

Chargers

Tigers

Blue jays

A. How much of each item had the teams sold by the end of the second week. Use matrices to solve the problem. Final answer must be given in matrix form. Show all work to receive full credit.

B. Which team had sold the most items at the end of the second week, and how many total items did they sell?

C. By the end of the third week, the totals were as follows:

H T

If the team makes a $0.50 profit on each hat it sells and a $2.00 profit on each T-shirt, how much profit did each team make? Final answer must be given in matrix form. Show all work to receive full credit.



Bears

Chargers

Tigers

Blue jays

Total at the end of Week 3

D. Which baseball team won the contest, and what was their total sales?

2. Use augmented matrices to solve the following  systems of equations. Show all work to receive full credit. Final answer must be given in matrix form.

A. 

Answer:

B. 

Answer:

3. A company’s employees are working to create a new energy bar. They would like the two key ingredients to be peanut butter and oats, and they want to make sure they have enough carbohydrates and protein in the bar to supply the athlete. They want a total of 22 carbohydrates and 14 grams of protein to make the bar sufficient. Using the following table, create a system of two equations and two unknowns to find how many tablespoons of each ingredient the bar will need. Solve the system of equations using matrices. Show all work to receive full credit.

***Grams of Nutrients per Tablespoon***

|  |  |  |
| --- | --- | --- |
|  | Carbohydrates | Protein |
| **Peanut Butter** | 2 | 4 |
| **Oats** | 8 | 1 |

A. Write an equation for the total amount of carbohydrates.

B. Write an equation for the total amount of protein.

C. Determine the augmented matrix that represents the previous two equations.

D. Solve for the previous matrix. Show all work to receive full credit.

E. How many tablespoons of each will there need to be for the new energy bar?

4. A total of 700 tickets were sold for a musical. Senior citizen tickets sold for $15, children tickets sold for $20, and adult tickets sold for $25; the total earnings from ticket sales was $15,750. Five times more children tickets were sold than senior citizen tickets. How many tickets of each type were sold? Set up a system of three equations and three unknowns, use an augmented matrix to solve, and show all work to receive full credit.

A. What are the three unknowns?

B. Write a separate equation representing each of the first three sentences of the word problem.

C. Determine the augmented matrix that represents the three equations.

D. Solve for the matrix. Show all work to receive full credit.

E. How many of each type of ticket were sold?

4

1. Along a straight shoreline, two lighthouses, *A* and *B*, are located 2000 feet apart. A buoy lies in view of both lighthouses, with angles 1, 2, and 3 as indicated. (Angle 1 is denoted by , angle 2 is denoted by , and angle 3 is denoted by .)

**A**

**B**

**44o**

**2**

**1**

**3**

**2000**

**C**



A. By looking at the picture, do you think  is an acute, obtuse, right, or a straight angle?

B. What can you say about the relationship between and ?

C. If , what is the measurement for ? Show all work as to how you received your final answer.

2. The two parallel lines *a* and *b* are cut by a transversal *c*. Find the missing angles, and give a brief explanation as to how you found each one.

***c***

***a***

1. 98o

13 12

***b***

14 15

17 16















3. A rectangle is a parallelogram with four right angles. A rectangle has a width of 15 feet and a diagonal of a length 22 feet; how long is the rectangle? What is the perimeter of the rectangle? Round to the nearest foot. Show all work to receive full credit.

**22 ft**

**15 ft**

Length of rectangle:

Perimeter of the rectangle:

4. The following picture shows a high school gymnasium. The art class is planning to create a circular design for the center of the floor, and the students know the diameter of the circle must be 16 feet. They have a budget of $100 and want to make sure they have enough money to buy paint to cover the full circle.

1. What is the area of the circle that needs to be painted?
2. If a pint of paint covers 60 ft2, how many pints of paint are needed to complete the job? Round up to the nearest pint.

1. If each pint costs $6.95, find the cost of the paint needed.

D. Will the art class be able to make its budget?

5. Judy and Pete are building a new house and want to carpet their living room, except for the entranceway and the semicircle in front of the fireplace that they want to tile (Alexander & Koeberlein, 2003).

**2 ft**

**2 ft**

**5 ft**

**2 ft**

**2 ft**

**2 ft**

**5 ft**

**17 ft**

1. How many whole square yards of carpeting are needed? (**Hint:** There are 9 square feet in one square yard.) Only whole square yards of carpet are sold. Show all work to receive full credit.
2. How many square feet are to be tiled? Show all work to receive full credit.

6. An observatory has the shape of a right circular cylinder topped by a hemisphere. The radius of the cylinder is 10 ft and its altitude measures 24 ft (Alexander & Koeberlein, 2003).



**24 ft**

**10 ft**

A. What is the approximate surface area of the observatory? Round to the nearest foot.

Show all work to receive full credit. (**Hint:** Remember the top and bottom of the cylinder will not be painted, so do not include them in your surface area. However, note that the hemispherical dome will be painted.)

B. If 1 gallon of paint covers 300 ft2, how many gallons are needed to paint the surface if it requires three coats? Round up to the nearest gallon. Show all work to receive full credit.

7. Two angles are supplementary of each other. Twice one angle is equal to the other

angle minus the product of six and eight.

1. Set up a system of linear equations to represent the two angles. (**Hint:** You will need two equations and two unknowns.)

1. Graph each of the equations on one rectangular coordinate system. (**Hint:** You must get *y*by itself before graphing.) Scale the graph accordingly; you will need your *x*-axis and *y*-axis to go to at least 200.

1. What do you notice about the intersection of the two lines?
2. Solve the system of equations in part A to determine the degrees of each angle by using Gaussian elimination.

5

1. The following chart shows some common angles with their degrees and radian measures. Fill in the missing blanks by using the conversions between radians and degrees to find your solutions. Show all work to receive full credit.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| *Degrees* | 0° |  | 45° |  | 90° |  | 270° | 360° |
| *Radians* |  |  |  |  |  | *π* |  |  |
|  |  |  |  |  |  |  |  |  |

Work shown here:

2. An A-frame lake house is 21 feet wide. If the roof of the home makes a angle with the base of the home, what is the length of the house from ground level to the peak of the roof? Round final answer to the nearest foot.

**21 ft**

**45o**

**45o**

3. Use common trigonometric identities for the functions given to find the indicated trigonometric functions. (**Hint:** Remember the reciprocal properties of sine, cosine, and tangent.) Show all work to receive full credit. Give answers in exact form – no decimals.

A. If  and , what are the values of

a) =

b) =

c) =

B. If  and , what are the values of

a) =

b) =

c) =

4. Solve the following application problem. Show all work to receive full credit.

A. A man at ground level measures the angle of elevation to the top of a building to be . If, at this point, he is 15 feet from the building, what is the height of the building?

Draw a picture, show all work, and find the solution. Round to the nearest hundredths.

B. The same man now stands atop a building. He measures the angle of elevation to the building across the street to be  and the angle of depression (to the base of the building) to be. If the two buildings are 50 feet apart, how tall is the taller building? See the following figure. Round to the nearest hundredths.

**33o**

**25o**

**50 ft**

5. A weather balloon *B* lies directly over a 1500-meter airstrip extending from *A* to *C*.

The angle of elevation from *A* to *B* is and from *C* to *B* is  (Larson, Hostetler, Edwards, 2005).

**34o**

**59o**

**1500**

**C**

**A**

Find the distances from *A* to *B* and from *C* to *B*. Show all work to receive full credit. Round to the nearest hundredths.