

Create a Math Task Project

Objective: You will create a math task that relates to one or more math concepts or math tasks we have covered. The task should be able to re-teach or reinforce an objective we have learned already this year. Task Types could be, but not limited to:

- Fair Sharing
- Designing something
- Solving a puzzle using math concepts
- Estimation

Topics to use within your task:

- Addition/Subtraction
- Multiplication/Division
- Rounding/Estimation
- Fractions and Probability
- Time and Money
- Other topics (Exponents, Graphing, Measurement, etc..)

Name: Give your task a creative name.

Task Presentations:

Task will be presented to the class, and then each student in the class will have a chance to try out your task. After, you will provide the worked out solution to your task and take any questions from classmates.

You will need to email the task along with your worked solution to your teacher prior to the presentation.

How will you be assessed?

- Task is not too easy, but not too challenging. Should take 5-7 minutes to complete if students are working in pairs.
- Each person must talk during the presentation
- It is clear what the purpose of the task is and it is easy to follow the instructions in solving the task
- Should state what mathematical topics are included within the task
- Answer to task explained clearly and it makes sense
- Talk about any limitations/extensions to task.



	1	2	3	4
<i>Interpret</i>	<ul style="list-style-type: none"> • Demonstrates limited reasoning skills in interpreting the situation. • Makes fundamental errors when making decisions about relevant information given in text, symbols, or graphical forms. 	<ul style="list-style-type: none"> • Demonstrates basic reasoning skills in interpreting the situation. • Makes some errors when making decisions about relevant information given in text, symbols, or graphical forms. 	<ul style="list-style-type: none"> • Demonstrates effective reasoning skills in interpreting the situation. • Makes minor errors when making decisions about relevant information given in text, symbols, or graphical forms. 	<ul style="list-style-type: none"> • Demonstrates advanced reasoning skills in interpreting the situation. • Makes no errors when making decisions about relevant information given in text, symbols, or graphical forms.
<i>Apply</i>	<ul style="list-style-type: none"> • Demonstrates limited success in selecting and applying an effective approach for the situation. • Creates algebraic expressions or equations with fundamental errors in logic. 	<ul style="list-style-type: none"> • Demonstrates some success in selecting and applying an effective approach for the situation. • Creates algebraic expressions or equations with some errors in logic. 	<ul style="list-style-type: none"> • Demonstrates success in selecting and applying an effective approach for the situation. • Creates algebraic expressions or equations with minor errors in logic. 	<ul style="list-style-type: none"> • Demonstrates success in selecting and applying a sophisticated approach for the situation. • Creates algebraic expressions or equations with no errors in logic.
<i>Solve</i>	<ul style="list-style-type: none"> • Demonstrates limited use of mathematical concepts and skills involved in the situation. • Mathematical solution is incomplete or incorrect, with fundamental calculation errors. 	<ul style="list-style-type: none"> • Demonstrates basic use of mathematical concepts and skills involved in the situation. • Mathematical solution is incorrect, with some calculation errors. 	<ul style="list-style-type: none"> • Demonstrates effective use of mathematical concepts and skills involved in the situation. • Mathematical solution is incorrect, with minor calculation errors. 	<ul style="list-style-type: none"> • Demonstrates advanced use of mathematical concepts and skills involved in the situation. • Mathematical solution is correct, with no calculation errors.
<i>Analyze</i>	<ul style="list-style-type: none"> • No attempt to assess the reasonableness of solution, or attempt contains fundamental errors in reasoning. • Demonstrates limited ability to suggest possible limitations of a solution, improvements to an approach, or alternate situations to which solution can be applied. 	<ul style="list-style-type: none"> • Assesses the reasonableness of solution, but contains some errors in reasoning. • Demonstrates basic ability to suggest possible limitations of a solution, improvements to an approach, or alternate situations to which solution can be applied. 	<ul style="list-style-type: none"> • Effective analysis about the reasonableness of solution, but may contain minor errors in reasoning. • Demonstrates effective ability to suggest possible limitations of a solution, improvements to an approach, or alternate situations to which solution can be applied. 	<ul style="list-style-type: none"> • Insightful analysis about the reasonableness of solution. • Demonstrates advanced ability to suggest possible limitations of a solution, improvements to an approach, or alternate situations to which solution can be applied.
<i>Communicate</i>	<ul style="list-style-type: none"> • Demonstrates limited ability to communicate using mathematical language (e.g., graphs, symbols). • Presents limited or irrelevant evidence for the solution. 	<ul style="list-style-type: none"> • Demonstrates basic ability to communicate using mathematical language (e.g., graphs, symbols). • Presents some evidence for the solution; solution may have inconsistencies or be difficult to follow. 	<ul style="list-style-type: none"> • Demonstrates effective ability to communicate using mathematical language (e.g., graphs, symbols). • Presents effective evidence for the solution using logical arguments. 	<ul style="list-style-type: none"> • Demonstrates advanced ability to communicate using mathematical language (e.g., graphs, symbols). • Presents sophisticated evidence for the solution using logical arguments.

ARE ELECTRIC CARS CHEAPER?

Nissan Leaf (Electric Vehicle)	Honda Civic
	
<u>COST BRAND NEW:</u> \$41 700	\$ 18 000
<u>GOVERNMENT INCENTIVE:</u> \$10 000	N/A
<u>FINANCING PROMOTION:</u> 0% 60 months	0% 60 months
Range: 250 km , cost per charge \$5	600 km per fill up Tank Size 46L - gas @ \$1.65 / L

Using the information above calculate for both cars the total cost per month and total cost (including gas/electricity) for 60 months (5 years). Assuming 25 000km per year driven.

What is the difference in cost between the two cars for years 5 to 7 ?

<u>Leaf</u>	<u>CIVIC</u>
$\$41700 - \$10000 = \$31700$	$\$18000 \div 60 = \$300/\text{month}$
$\$31700 \div 60 = \$528.33/\text{month}$	$25000 \div 600 = 41.67 \text{ fill ups/year}$
$25000 \text{ km} \div 250 = 100 \text{ charges/year}$	$41.67 \times 46L \times \$1.65 = \$3162.50$ gas per year
$100 \times \$5 = 500\$$	
$\$500 \div 12 = 41.67 \$ \text{ charging per month}$	Cost per month
Total cost /month : $528.33 + 41.67 = \$570/\text{month}$ ^{total cost}	$\$300 + (3162.50 \div 12) = \563.54
Total cost 5 years: $\$570 \times 60 = \underline{\$34200}$	Total cost : $563.54 \times 60 = \underline{\$33812.40}$ 5 years
<u>Years 6-7</u> → car paid off, pay charging only	<u>years 6-7</u> → car paid off, gas only
$50000 \text{ km} \div 250 \text{ km} = 200 \text{ charges}$	$50000 \div 600 = 83.33 \text{ fill ups}$
$200 \times \$5 = \1000 total for 2 years	$83.33 \times 46L \times \$1.65 = \$6325$ total for 2 years.

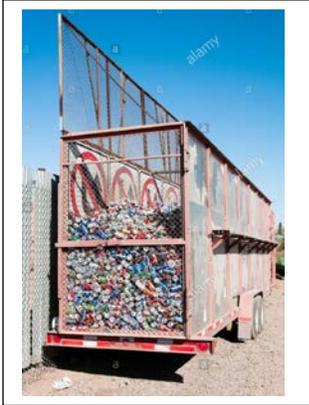
Aluminium Recycling:

24 Aluminium cans in a pound

Can capacity – 350 cm³

Each pound of cans is worth \$1.80

Dimensions of the trailer L = 10 feet W = 4 feet H = 6 feet



Optional information to provide:

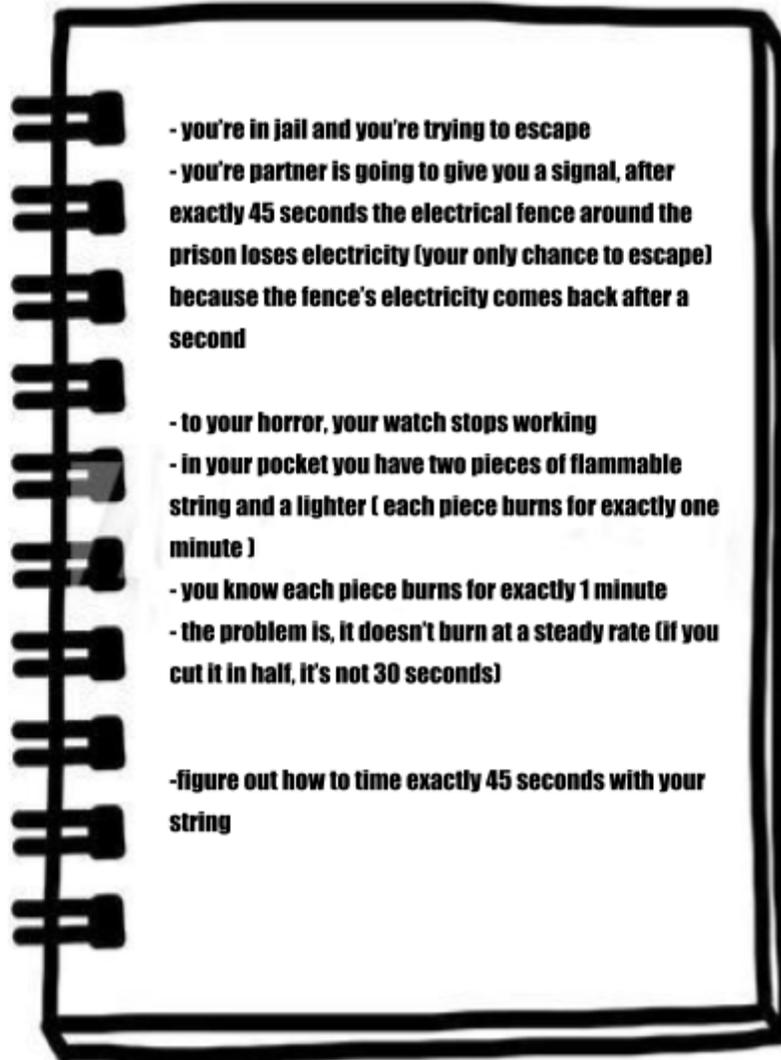
1 foot = 30.48

Volume Trailer : L x W x H

Question:

Estimate the value of cans that can completely fill up the trailer. State any assumptions and provide reasoning through calculation.

Prison Break



• Addition + subtraction

• Time and money

Aliyah, Katherine, Jaskarn

Solution:

You know that a piece of string takes 60 seconds to burn from end to end but the problem is the string doesn't burn at a steady rate so you can't tell how much time is left by looking at how much has burned. If you burn it from one end, the 30 second mark will be at the same place as if you burned it from the other end. That means if you burn both ends at the same time, it will burn out in exactly 30 seconds. Now that you calculated 30 seconds, you need to figure out how to calculate the remaining 15 seconds ($45 \text{ sec} - 30 \text{ sec} = 15 \text{ sec}$). To calculate the remaining 15 seconds, you can use the second string with the same formula.

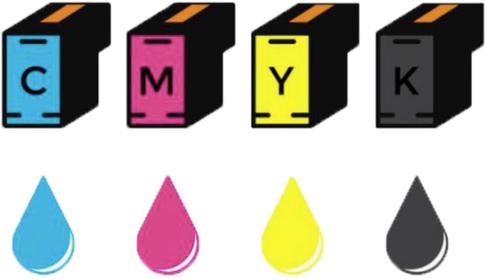
If you light both ends of the first string at the same time as you light one end of the second string, by the time the first string had burned out, you know that there's 30 seconds remaining on the second string. On the 30 second mark, you begin burning the other end of the second string and by the time it's burned out, your 15 seconds is up.

If your calculations are correct, you should be out of the prison grounds and home in no time!

The Ink Scam

By: Kimmy And Sanyu

A certain company sells printers and ink for the prices below

Ink Cartridges Set	Printer (No ink Included)
	
<p style="text-align: center;">Retail Price \$60</p>	<p style="text-align: center;">Retail Price \$70</p>
<p style="text-align: center;">Manufacturing Price \$0.24</p>	<p style="text-align: center;">Manufacturing Price \$120</p>

How much more money are you paying for both the printer and ink cartridges?

How much money could the company make if they spent \$300 on manufacturing ink cartridges?

Printers don't usually use up all your ink and they force you to buy a new cartridge. Assuming you only use around 80% of an ink cartridge, how much money is wasted if you have used 17 cartridges.

(all the cartridges are worth the same amount)

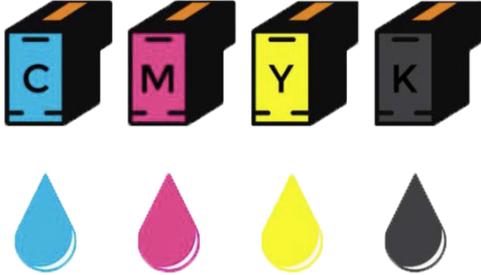
Magenta	\$20
Yellow	\$10
Cyan	\$25
Black	\$5

The ink cartridges are prices are listed beside. If every time you print something in black, only 87.7% of it is actually black and the rest are the other colours (assuming it's an equal amount of them) How much money are you spending to use up 100% of the black ink.

The Ink Scam

By: Kimmy And Sanyu

A certain company sells printers and ink for the prices below

Ink Cartridges Set	Printer (No ink Included)
	
<p>Retail Price \$60</p>	<p>Retail Price \$70</p>
<p>Manufacturing Price \$0.24</p>	<p>Manufacturing Price \$120</p>

How much more money are you paying for both the printer and ink cartridges?

Answer: $(70 + 60) - (120 + 0.24)$

How much money could the company make if they spent \$300 on manufacturing ink cartridges?

Answer: $300 = 0.24n \rightarrow n = 1250 \rightarrow 60n = 75000$

Printers don't usually use up all your ink and they force you to buy a new cartridge. Assuming you only use around 80% of an ink cartridge, how much money is spent if you have used 17 cartridges.

(all the cartridges are worth the same amount)

Magenta	\$20
Yellow	\$10
Cyan	\$25
Black	\$5

Answer for above: $17 \times 0.8 = 13.6 \times 15 = 204 \rightarrow$

$15 \times 17 = 255 - 204 = 51$

Answer: $0.123 / 3 = 0.041$

$0.041 \times 20 = 0.82 \quad 0.041 \times 10 = 0.41 \quad 0.041 \times 25 = 1.025$

$1.025 + 0.82 + 0.41 + 5 = 6.855$ rounds to 6.86

1. In Semiahmoo fishing club there are 100 members. The number of male members in the club is 50 members more than the female members. What percent is the number of males out of the whole population of the club?

2. Find the distance from (3,2) to the line $Y = -2x - 1$
A line runs through (3,2) and is perpendicular to $Y = -2x - 1$

Distance formula is $\sqrt{(X_2 - X_1)^2 + (Y_2 - Y_1)^2}$

1. x =number of males
 y =number of females

$$x+y=100$$

$$x=y+50$$

$$y+(y+50)=100 \quad x=25+50=75$$

$$2y=100-50$$

answer: 75%

$$2y=50$$

$$y=25$$

2. $Y - 2 = \frac{1}{2}(x - 3)$

$$L1 = Y = \frac{1}{2}x + \frac{1}{2}$$

$$L2 = Y = -2x - 1$$

Then we put them into a system of equations.

$$\left\{ \begin{array}{l} Y = -2x - 1 \\ y = \frac{1}{2}x + \frac{1}{2} \end{array} \right\}$$

Then we find out the solution.

Which is $\left(\frac{-3}{5}, \frac{1}{5}\right)$

Lastly we put the solutions into the formula to solve for the distance.

$$\sqrt{\left(\frac{-3}{5} - 3\right)^2 + \left(\frac{1}{5} - 2\right)^2}$$

Answer : $\frac{9\sqrt{5}}{5}$

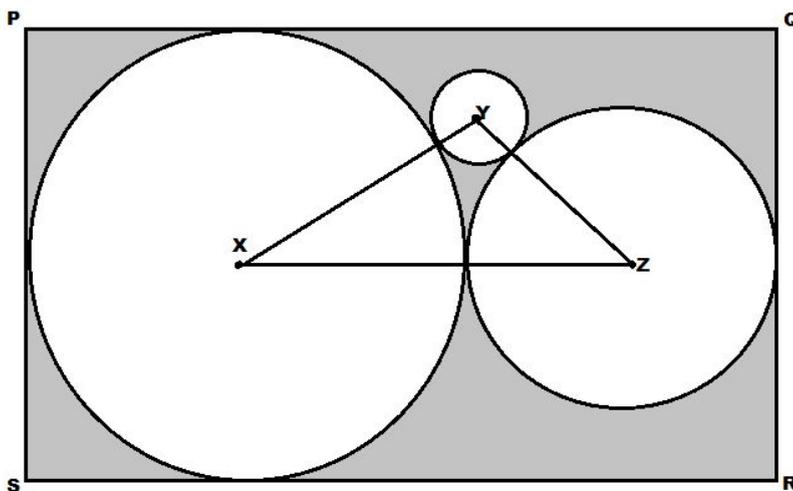
Math Task: circles in a box, can you solve?

In the diagram, each of the circles with the centres X, Y, and Z is tangent to the two other circles. The center black dot within each circle is situated exactly in the middle of their respective circle, as shown below in the diagram. If $XY=30$, $YZ=20$, and $XZ=40$, what is the area of the shaded region? Round to the nearest tenth.

Area of Rectangle: $length \times width$

Area of Circle: πr^2

Diameter of Circle: $2r$



Solution:

Let the radii of the circles with centres X, Y and Z be x, y, and z, respectively. The distance between the centres of two touching circles equals the sum of the radii of these circles.

Therefore, $XY = x+y = 30$, $XZ = x+z = 40$, and $YZ = y+z = 20$. By adding these equations we obtain $(x+y)+(x+z)+(y+z) = 30 + 40 + 20$. This equation can be simplified to $x+y+z = 45$.

Since $x + y = 30$, and $x + y + z = 45$, $35 + z = 45$ and so $z = 15$. Following the same steps, $y = 5$ and $x = 25$.

Knowing the radii will allow us to calculate the dimensions of the rectangle.

Since the circle with the centre X touches three sides of the rectangle, side PS of the rectangle is equal to the diameter of the mentioned circle. Using the formula $d=2r$, we can determine the length of PS, which is 50. The side SR can be calculated by determining the sum of the diameters of circles X and Z. Once again, using the formula $d=2r$, the diameter of circle Z can be calculated as 30. $30 + 50$ is 80 therefore side SR is 80.

Now that both the length and width of the rectangle are known, the area can be calculated using the formula $a=lw$. $a = 50 \times 80 = 4000$. The area of the entire rectangle including the circles is 4000. To find the area of the shaded region, we subtract the total area of three circles

from the area of the entire rectangle. The area of the circles can be calculated using the formula $a=\pi r^2$.

Area of circle X: 625π

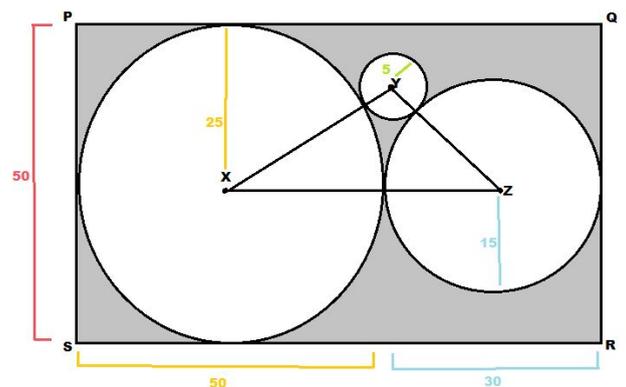
Area of circle Y: 25π

Area of circle Z: 225π

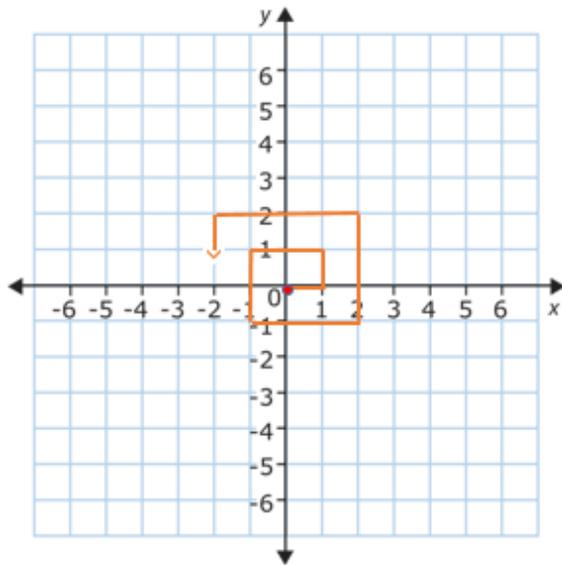
Total area of three circles: 875π

Now that we have the values for both the area of the rectangle and the area of the circles, we simply subtract. $4000-875\pi \approx 1251.1$

The area of the shaded region is 1251.1



Solution:



2 moves- (1, 1)

2+4moves- (-1,-1)

2+4+6moves- (2, 2)...

2+4moves- (-1,-1)

2+4+6+8moves- (-2,-2)

2+4+6.....+4k- (-k,-k)

→ $2(1+2+3...+2k)$

$S_{2k} = 2\{2k(2k-1)\}/2$

$= (-k,-k)$

$(-k,-k)$ takes $2k(2k+1)$

Know we need 2015 moves to get to P_{2015} .

Find greatest k to let $2k(2k+1) \leq 2015$

Let $2k=a$ $a(a+1) = a^2+a$

Find the greatest perfect square

that's close to 2015

We find out $44^2=1936$

$2k=a=44$ $k=22$

$44(45)$ moves- $(-22,-22)$

$2015-1980=35$

Know that from $(-k,-k)$ to move to the next point you have to go East (positive in X-axis)

$P_{2015}=2015$ moves

$= (-22+35,-22)$

$= (13,-22)$

Answer: (13,-22)