Part 1.

Emma is going camping with friends! Emma's friends are planning on swimming in the lake while they are there but Emma isn't waterproof. Emma decides to buy some waterproof paint so Emma can also go swimming. Help Emma figure out how much paint Emma needs:

Step	Body Part	Surface Area (inches)	Volume of Paint (fluid oz)
0	Legs	6	2
1	Arms	3	
2	Body		3

Solution:

STEP ONE

Step	Body Part	Surface Area (inches)	Volume of Paint (fluid oz)
0	Legs	6	2
1	Arms	3	***1***
2	Body		3

$$6\ inches\ :\ 2\ oz$$
$$3\ inches\ :\ ?$$

$$\frac{6\ inches}{2\ oz} = \frac{3\ inches}{?\ oz}$$
$$6 \div 2 = 3$$
So… $2 \div 2 = 1$

STEP TWO

Step	Body Part	Surface Area (inches)	Volume of Paint (fluid oz)
0	Legs	6	2
1	Arms	3	***1***
2	Body	***9***	3

$$6\ inches\ :\ 2\ oz$$
$$3\ inches\ :\ 1\ oz$$
$$?\ :\ 3\ oz$$

$$\frac{6\ inches}{2\ oz} = \frac{?\ inches}{3\ oz}$$
$$1 \times 3 = 3$$
So… $3 \times 3 = 9$

Part 2.

In addition to waterproof paint, Emma may need to buy some extra batteries. Emma is powered by a special type of electric battery. She wants to find a way to tell how long her batteries last so that she has a better idea of how many to get when she goes to the store. Help Emma figure out how much battery power she will use depending on how long she is out.

Step	Battery Usage	Time
0	$\frac{1}{20}$ of battery's power	$\frac{2}{3}$ of an hour
1		1 hours
2		3 hours

Solution
Step 1

Step	Battery Usage	Time
0	$\frac{1}{20}$ of battery's power	$\frac{2}{3}$ of an hour
1	**$\frac{3}{40}$ of battery's power**	1 hour
2		3 hours

$$\frac{1}{20} battery : \frac{2}{3} hour$$

$$?? \; battery : \; 1 \; hour$$

$$\frac{2}{3} hour \times \; ?? \; = 1 \; hour$$

$$\frac{2}{3} \times \frac{3}{2} = 1$$

$$\frac{1}{20} \times \frac{3}{2} = \frac{3}{40}$$

In 1 hour, $\frac{3}{40}$ of battery's power is used

Step 2

Step	Battery Usage	Time
0	$\frac{1}{20}$ of battery's power	$\frac{2}{3}$ of an hour
1	**$\frac{3}{40}$ of battery's power**	1 hour
2	**$\frac{9}{40}$ of battery's power**	3 hours

$$\frac{3}{40}\ battery : 1\ hour$$

$$?? : 3\ hour$$

$$1 \times ?? = 3$$

$$1 \times 3 = 3$$

$$\frac{3}{40} \times 3 = \frac{9}{40}$$

In 3 hours, $\frac{9}{40}$ of the battery's power is used

Part 3.

Emma is going to need to head to the store to buy the waterproof paint. However, Emma lives in a neighborhood VERY far from the store. Emma is going to have to ride a bike! Use the below table to help Emma figure out where to stop to rest at different points throughout the ride.

Step	Time (hours)	Distance (miles)
0	2.5	25
1		30
2	7.25	

Solution:

STEP ONE

Step	Time (hours)	Distance (miles)
0	2.5	25
1	***3***	30
2	7.25	

$2.5 \ : \ ??$

$25 \ miles \ \div \ 2.5 \ hours \ = \ ??$

$25 \ \div \ 2.5 \ = \ 10 \ miles \ per \ hour$

$30 \ miles \ \div 10 \ miles \ per \ hour = 3 \ hours$

STEP TWO

Step	Time (hours)	Distance (miles)
0	2.5	25
1	***3***	30
2	7.25	***72.5***

Now know unit rate: $10\ miles\ per\ 1\ hour$

$7.25\ hours \times 10\ miles\ per\ hour = ??\ miles$

$7.25 = 7\frac{1}{4} \times 10 = 70 + 2.5 = 72.5$

Part 4.

Emma has a different kind of battery which may work better; it is a lot smaller and easier to carry than her other battery. She is trying to figure out how long the one battery will last. This will help her plan for how many batteries she should buy so she can spend the whole day with her friends! She uses 2/15 of the battery's power in a half an hour.

Step	Battery Usage	Time
0	$\frac{2}{15}$ of battery	0.5 hours
1	1 whole battery	

Solution
Step 1

Step	Battery Usage	Time
0	$\frac{2}{15}$ of battery	0.5 hours
1	1 whole battery	**$3\frac{3}{4}$ hours**

$$\frac{2}{15}\ battery : 0.5\ hour$$

$$\frac{2}{15}\ battery : \frac{1}{2}\ hour$$

$$1\ battery :\ ??\ hours$$

$$\frac{2}{15}\ battery\ \times\ ?? = 1\ battery$$

$$\frac{2}{15} \times \frac{15}{2} = 1$$

$$\frac{15}{2} \times \frac{1}{2} = \frac{15}{4} = 3\frac{3}{4}$$

It takes $3\frac{3}{4}$ hours to use 1 whole battery

Part 5.

Emma wants to make sure to have enough batteries for the whole trip. They will be gone for $2\frac{3}{4}$ days. How many batteries should she buy at the store?

Step	Number of Batteries	Time
0	`1 whole battery	$3\frac{3}{4}$ hours
1		$2\frac{3}{4}$ days

Solution

Step 1

Step	Number of Batteries	Time
0	`1 whole battery	$3\frac{3}{4}$ hour
1	18 batteries	$2\frac{3}{4}$ days

$$2\tfrac{3}{4}\ days\ =\ (4\times 2)+3\ =11\ ...\ \tfrac{11}{4}\ days$$

$$.\ \tfrac{11}{4} days\times 24\ hours\ ...\ =\ 66\ hours$$

$$1\ battery:\ 3\tfrac{3}{4}\ hours$$

$$??\ batteries\ :\ 66\ hours$$

$$3\tfrac{3}{4}\ hours\ \times\ ??\ =\ 66\ hours$$

$$??\ =\ 66\ \div 3\tfrac{3}{4}\ =17.6$$

$$1\ battery\ \times 17.6\ =\ 17.6\ batteries\ =\ 18\ batteries$$

Part 6.

In preparing for camping, Emma's friends Tasha and Zach have been arguing over who is better at making s'mores. Tasha has suggested that they use math to figure out who is fastest. Tasha already has a function for how quickly she can make s'mores. It is given below. Help Emma make a function for Zach given that we know how many minutes it takes him to make 9 s'mores and it takes 1 minute for him to setup.

Step	**S'more Maker**	**Minutes (y)**	**S'mores (x)**	**Set-up (b)**	**Slope (m)**
0	Tasha	8	2	4	2
1	Zach	9	2	1	

Solution
Step 1

Step	**S'more Maker**	**Minutes (y)**	**S'mores (x)**	**Set-up (b)**	**Slope (m)**
0	Tasha	8	2	4	2
1	Zach	9	2	1	**4**

$$y = mx + b$$

Tasha's equation: $y = 2x + 4$

For Zach's equation…

$$minutes = m \times (2\ s'mores) + 1\ minutes\ for\ setup$$

$$9\ minutes = ?? \times 2\ s'mores + 1\ minute$$

$$9 = 4 \times 2 + 1$$

$$m = 4\ minutes\ per\ s'more$$

So the equation for Zach's time is **T=4s** + 1, when **T** stands for the amount of time, in minutes, it takes for them to make all the s'mores, and **s** stands for the amount of s'mores they are making.

Part 7.

Emma wants to use the equation to figure out how long it takes Tasha and Zach to make 10 s'mores each. Help Emma fill in how long it takes Tasha to make different amounts of s'mores.

Step	S'more Maker	Amount of Smores (s)	Time (T)
0	Tasha	**s =** 0	4
1	Tasha	**s =** 10	

Solution

Step 1

Step	S'more Maker	Amount of Smores (s)	Time (T)
0	Tasha	**s =** 0	4
1	Tasha	**s =** 10	**24**

Using Zach's equation of: **T** = 2**s** + 4
Step Zero: T = 2(0) + 4

Step One...

s = 10

T = 2(**s**) + 4

T = 2(10) + 4

T = 20 + 4

T = 24

It takes Tasha 24 minutes to make ten s'mores.

Part 8.

To compare how quickly Tasha and Zach can make s'mores, Emma has to figure out how long it takes Zach to make 10 s'mores using Zach's equation.

Step	S'more Maker	Amount of Smores (s)	Time (T)
0	Zach	**s =** 0	1
1	Zach	**s =** 10	

Solution

Step 1

Step	S'more Maker	Amount of Smores (s)	Time (T)
0	Zach	**s =** 0	1
1	Zach	**s =** 10	**31**

Using Zach's equation of: **T** = 4**s** + 1.
Step Zero: T = 4 (0) + 1

Step One...

s = 10

T = 4(**s**) + 1

T = 4(10) + 1

T = 40 + 1

T = 41

It takes Zach 41 minutes to make ten s'mores.
While Zach is faster at setting the s'more station up, Tasha can actually make more s'mores faster when the amount of s'mores made increases.