

Paper-to-Code Puzzle

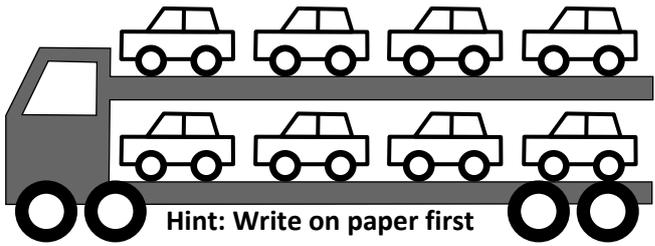
Read the Puzzle Carefully: A new red car is produced every 7 minutes and a new yellow car every 5 minutes. Cars are parked on the transport truck in the order of production, top floor first. Work out the solution with pencil and paper. Draw a picture. Write a list of the time intervals. Use shading to tell between the red and yellow cars.

Then, ask yourself is it possible to code this puzzle in Scratch? All you'd need to do is *add small details* and code the solution to run at the click of a button. That is the case and here's the solution script.

<https://scratch.mit.edu/projects/372760810>

Car Transportation 1

a common multiples puzzle



Hint: Write on paper first

A new red car is produced every 7 minutes and a new yellow car every 5 minutes. Cars are parked on the transport truck in the order of production, top floor first. Edit the code to show what the truck will look like after the first eight cars are loaded. Press the RUN button when you are ready.

Solution Strategy 1: Work the solution out on paper:

1. Write out the first eight multiples of 5: **5, 10, 15, 20, 25, 30, 35, 40**

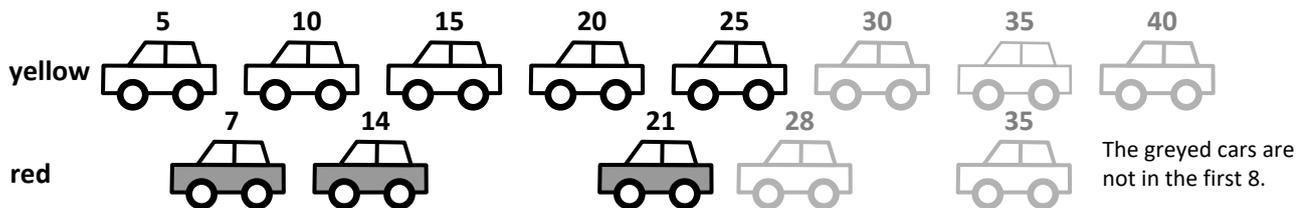
If all the cars were yellow, the first eight cars would take 40 minutes to produce.

2. Write out multiples of 7 less than 40: **7, 14, 21, 28, 35**

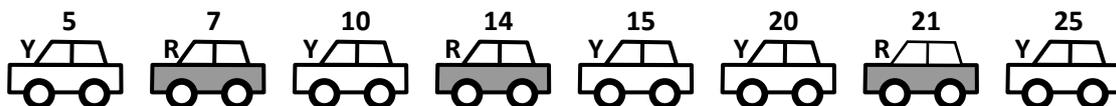
If all the cars were red, in 40 minutes only 5 cars would be produced.

3. Draw a picture to show the two lines of production, yellow above the red.

The **1st** yellow car takes 5 minutes. The first red car takes 7 minutes. That means the **2nd** car is red.



After the **2nd** car, the next **red** will not be ready until the 14th minute. By then the **3rd** car has been made after 10, and it is yellow. Next it's the second **red car which is 4th** on the transporter at 14 minutes. It's followed immediately by the **5th**, a **yellow** car at 15 minutes and the **6th** is also a **yellow** car after 20 minutes. So far, 6 of the eight cars are already on the truck. There are four yellow and two red. **Why are there only two red, after 20 minutes?** Continue to load and describe the last two cars on the transporter. **Shade in the picture (red cars shaded).**



Solution Strategy 2: Code the Puzzle in Scratch

1. Draw draw a simple car in SCRATCH and give it **three costumes**, white, yellow and red.



Costumes 1

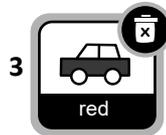
The white costume is what's seen at the start.



The yellow and red costumes will show at the appropriate time intervals.



5, 10, 15,
20, 25



7, 14, 21

2. Draw the transporter truck on the backdrop and use the text tool to type the words of the puzzle in as few words as possible.

3. We need a RUN button which we can get in the Sprite library.

4. **The code:** (see next page)

First we will code the RUN button

Second, we will code the **car 1** sprite and

then make 7 copies, **car 1** to **car 8**. The code from **car 1** will copy with each duplicate of car 1. We can make small detail changes in the code for each car.

continue to step 5 next page

5. Code the RUN button.

The button has two costumes. That's the purpose of *repeat* (2). The main purpose of the button code is to broadcast the 'run' message to each car sprite at the same instant, when the button is pressed (clicked).

6. Code the car before making 7 duplicates. There are 2 short scripts on the car sprite.

The same two scripts will be on each car duplicate. We will then make a very small change to the script

*The size and x, y details will be unique to your code.

Timescale:

0.5 seconds in Scratch = 1 min in the story.

After duplication the 'run' message will be received simultaneously by each car when the RUN button is pressed

The costumes will change in the sequence 5, 7, 10, 14, 15, 20, 21, 25 each multiplied by 0.5 seconds apart.

7. Make 7 duplicates of car 1. Spread the 8 cars evenly into two rows on the transportation truck and give them their x,y location.

Change the length of each wait duration in the multiplication operator in each car's code as shown:

Also change the costume colours in the switch costume blocks.

8. Run the project at: <https://scratch.mit.edu/projects/372760810> Click the 'See inside' button

9. Click the 'See inside' button and complete the missing details of the code for car 2, car 5 and car 8

Get Inside The Puzzle

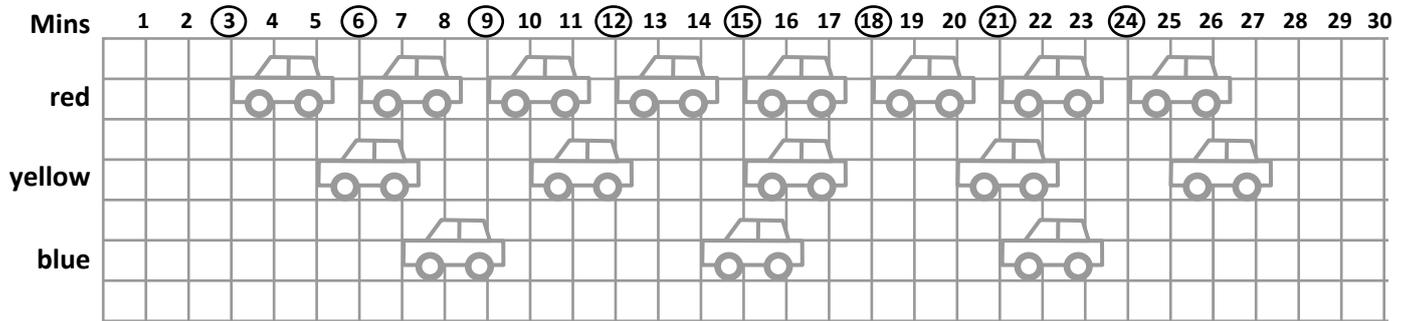
Car Transportation 2

red, yellow and blue cars

The Puzzle: A new red car is produced every 3 minutes, a new yellow car every 5 minutes and a new blue car every 7 minutes. Cars are parked on the transport truck in the order of production, top floor first. Use the same two strategies as you did in solving **Puzzle 1**. **(1)** Draw a picture and **(2)** Edit the code from Puzzle 1 to show what the truck will look like after the first eight cars of **three colours** are loaded.

Solution Strategy 1: Draw a Picture

Squared paper could be helpful.



○ The quickest cars to produce are red. The time of eight red cars is circled.

1. Draw a line of cars to represent the **red** ones, one for every 3 minutes, until you have **eight** cars. If all the cars were yellow, they would be produced in 24 minutes.
2. Under the line of red cars draw a line of yellow cars, one every 5 mins. Under the line of red cars, draw a blue car for every 7 mins.

3. The first **red** car at **3 mins** takes less time than the first yellow car at **5 mins**. By the time the first **blue** car is produced at **7 mins** a second **red** car has already been produced at **6 mins**. At seven minutes the first 4 cars are produced in the order: *red, yellow, red, blue*
4. Figure out the next four cars.
5. You should be able to find the solution to the questions from the picture.

Solution Strategy 2: Code the Puzzle in Scratch

Copy and edit the code from Puzzle 1

*The size and x, y details will be unique to your code.

Allow **one second** for each ONE minute in the story.

<https://scratch.mit.edu/projects/372766637>
Press the RUN button to see the car colours show.

Car Transportation 2

red, yellow and blue cars

Hint: Write on paper first

A new red car is produced every 3 minutes, a new yellow car every 5 minutes and a new blue car every 7 minutes. Cars are parked on the transport truck in the order of production, top floor first. Edit the code to show what the truck will look like after the first eight cars are loaded. Press the RUN button when you are ready.

RUN

Questions

- Q1. How long will it take to produce the first eight cars?
- Q2. How many of each colour are on the transporter in the first eight?
- Q3. What colour is the last car?
- Q4. At what precise time are two cars produced simultaneously?
Explain why this happens.
- Q5. What colour is first in the next batch on the transporter?
- Q6. What is the line up of the second batch of 8 cars?