You have to talk about this subject for ten minutes. Which mathematical notion(s) do you recognise ?
The questions may help you, but answering all of them is not compulsory :
you can simply explain a way to solve an exercise, even if you can't find the solution.

This exercise introduces a husband and wife with brown eyes who have 0.75 probability of having children with brown eyes, 0.125 probability of having children with blue eyes, and 0.125 probability of having children with green eyes.

Question 1: Let's assume that they want to have 2 children:

We will denote:

BR_1 the event :"the first child has brown eyes", BR_2 the event: "the second child has brown eyes"

BL_1 the event :"the first child has blue eyes", BL_2 the event: "the second child has blue eyes"

G_1 the event :"the first child has green eyes", G_2 the event: "the second child has green eyes"

a) What is the probability that their first child has green eyes and the second has not?
b) What is the probability that exactly one of their two children has green eyes?
c) Compute the probability that the second child has green eyes.
d) Given that the second child has green eyes, compute the probability that the first child also has green eyes.

Question 2: Let's assume that they want to have 6 children:

a) What is the probability that exactly two have green eyes?
b) What is the probability that at least one has green eyes?
c) How many of the 6 children would have green eyes on average?

Source: OpenIntro . "Binomial distribution exercises." OpenIntro Statistics. Boundless, 21 Jul. 2015. Retrieved 04 Feb. 2016 from https://www.boundless.com/users/233402/textbooks/openintro-statistics/distributions-of-random-variables-3/exercises-31/binomial-distribution-exercises-154-13767/

Image : http://www.bebesetmamans.com/images/02_PHOTOS_GALERIES/5233/5233-1-quelle-couleur-yeux-bebe.jpg

In the USA, a survey is carried out concerning the next presidential elections. One of the main candidates is the very famous Donald Trump. There are the primary elections and the presidential general election.

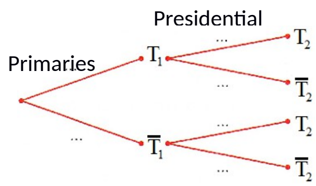
➢ 55% of the people interviewed plan to vote for Donald Trump in the primaries.

➢ Among the people who plan to vote for Donald Trump in the primaries, 80% are sure to vote for him again at the presidential election.

➢ Among the people who plan not to vote for Donald Trump in the primaries, 15% are ready to change their minds and vote for Trump in the presidential election.

Let T_1 be the event: The person interviewed plans to vote for Trump in the primaries.

Let T_2 be the event: The person interviewed plans to vote for Trump in the Presidential election.



1. a) Give the probabilities $p(T_1)$, $p_{T_1}(T_2)$, $p_{\overline{T_1}}(T_2)$.

   b) Copy and complete the probability tree to the right:

2. a) Calculate the probability that a person interviewed votes for Trump in both elections.

   b) Calculate the probability that a person interviewed votes for Trump in the presidential election.

3. A person who has voted for Trump in the presidential election is interviewed.

What is the probability that he/she has voted for Trump in the primaries.

Source: Ken Catalino | Trump Electability / www.usnews.com

4. a) Let F be the event: « The person has voted for Trump in the primaries and not in the presidential election ». Prove that P(F)= 0.110.

b) Five people are randomly interviewed. We suppose that the choices of these five persons are independent. X is the variable which takes the values of the number of persons interviewed who have voted for Trump in the primaries and not in the presidential election.

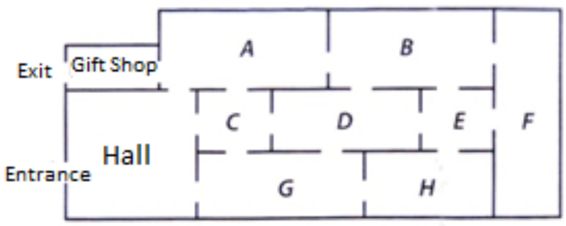
→ in a few words explain the law followed by the variable X.

→ interpret in terms of election the numbers p(X=2) and p(X>=1) and work them out.

DIRECTOR OF A MUSEUM

Carpet = moquette

The map below shows the rooms A-H of a museum, the gift shop and the hall. The gaps in the walls represent doors between the rooms.
Do not consider the entrance door and the exit door.



1) Draw a graph to summarize the situation.

2) Is the graph connected? Complete?

3) Every morning, the director, starting in the hall, opens each interior door.
Is it possible for the director to enter the museum in the hall, walk through each interior door of the museum exactly once, and exit from the hall?

4) The director decides to put a carpet in each room, including the gift shop and the hall.
Two adjacent rooms can't have the same color. How many different colors are required?

You have to talk about this subject for ten minutes. Which mathematical notion(s) do you recognise ?
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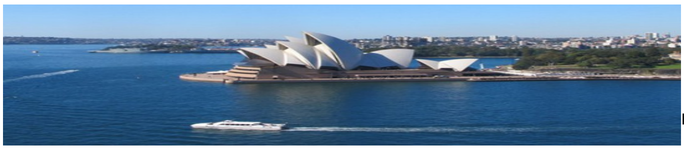
Sydney Harbour



http://www.australie-guidebackpackers.com/

Introduction:

The Sydney Harbour Cruising Company slogan is: "A must do experience for every visitor to Sydney. Discover the most beautiful harbour in the world on an amazing sightseeing cruise…"
The profit the company makes depends on the amount of money it spends on advertising.

The profit (in **thousands of dollars**) is given by: $P(x) = -4x^2 + 72x + 20$ where x is the amount (in **thousands of dollars**) the company spends on advertising.

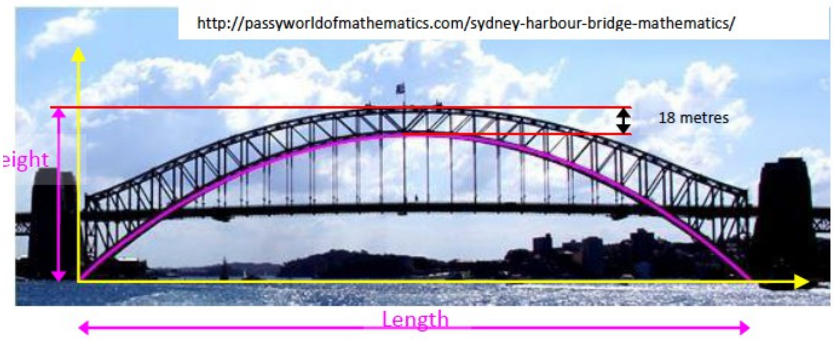
Questions :

Part A:

1. Calculate the profit the company makes when it doesn't advertise.
2. The manager wants to make a profit greater than two hundred thousand dollars. How much money should he spend on advertising?
3. What's the maximum profit that he can expect?

Part B:

The picture below represents the Sydney Harbour Bridge built in 1932. This bridge is nicknamed "The Coathanger" because of its arch-based design or is simply called "the Bridge" by Sydney residents.



The equation of the lower arch of this bridge is: $y = -0.0018655(x-251.5)^2 + 118$

After factoring it can also be written: $y = -0.0018655\,x(x-503)$

With this information, can you describe this arch and, more precisely, work out the length and the height of this bridge ? No calculation is needed. Explain your reasoning.