

PART B

This part of the examination consists of Questions 7 to 10.

Each question in this part of the examination is worth 4 marks.

Write each of your answers in the space provided on page 5 of your Student Booklet.

TOPIC 1: OPTIMIZATION

7. The system of inequalities and the polygon of constraints below are associated with an optimization situation. Each side of the polygon and its corresponding inequality are identified by the same number.

① $y \leq 4x$
 ② $y \leq (-2x + 114)$
 ③ $x - 10y \leq -90$

$x - 10y = -90$
 $x - 10(-2x + 114) = -90$
 $x + 20x - 1140 = -90$
 $21x = 1050$
 $x = 50$

What are the coordinates of vertex P of this polygon of constraints?
 $P(50, 14)$

→ Plug back into other equation:
 $y = -2x + 114$
 $y = -2(50) + 114$
 $y = -100 + 114$
 $y = 14$

TOPIC 1: OPTIMIZATION

8. An airline is having a seat sale for a flight. In order for this flight to be profitable, the following two constraints regarding the number of passengers must be taken into account.

- a) There must be a minimum of 50 passengers.
 b) There must be at least twice as many adult passengers as child passengers.

where x : number of child passengers on the flight
 y : number of adult passengers on the flight

What inequalities represent these two constraints?

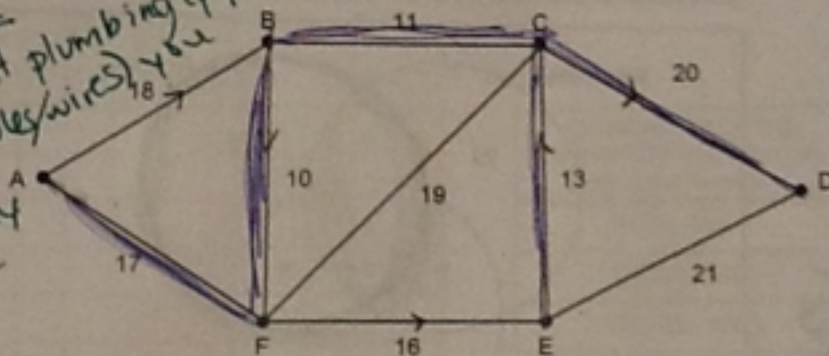
$50 \leq x$
 $y \geq 2x$
 $x + y \geq 50$
 a) $x + y \geq 50$
 b) $y \geq 2x$

TOPIC 2: GRAPH THEORY

9. The owner of a company would like to install cables to connect six computers. He drew the graph below to illustrate the situation.

In this graph, the vertices represent the computers to be connected. The edges represent the cables that could be installed. The number on each edge indicates the length, in metres, of the corresponding cable.

*** REMEMBER**
 When looking at plumbing (pipes) or electricity (cables/wires), you don't need to follow a path, they just need to all be touching



To reduce costs, the owner will install only some of these cables to connect the six computers.

What is the total minimum length of cables required to connect the six computers?

$$17 + 10 + 11 + 19 + 16 + 21 = 94$$

$$19 + 16 + 16 + 13 + 20 = 77$$

77 metres of cable will be the total minimum to connect all computers.

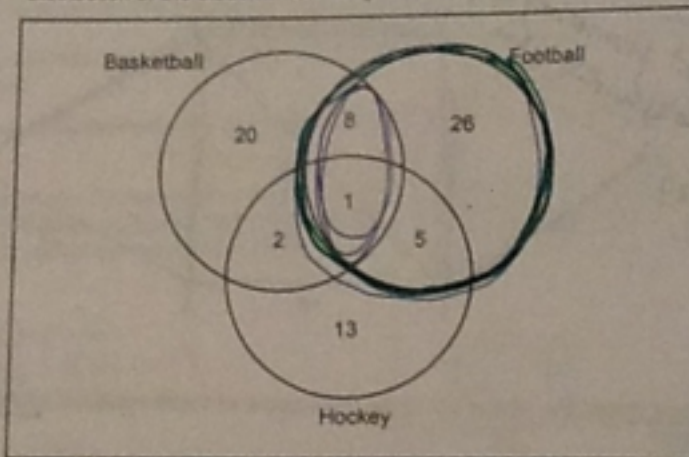
$$17 + 10 + 11 + 13 + 20 = 71$$

TOPIC 4: PROBABILITY

10. During the school year, the 75 Secondary V students in a school had a chance to play three different sports: basketball, football and hockey.

The Venn diagram below represents the distribution of the 75 students according to the sport or sports they played.

Distribution of the students according to the sport or sports they played



Means we are only looking at

One of these students is randomly chosen to receive a participation prize.

Given that the student chosen played football, what is the probability that he/she played basketball?

Football total: $26 + 5 + 8 + 1 = 40$

overlap w/ basketball: $8 + 1 = \frac{9}{40}$

