TONBRIDGE SCHOOL

Test for Entrance into Year 12 in September 2022

Computer Science

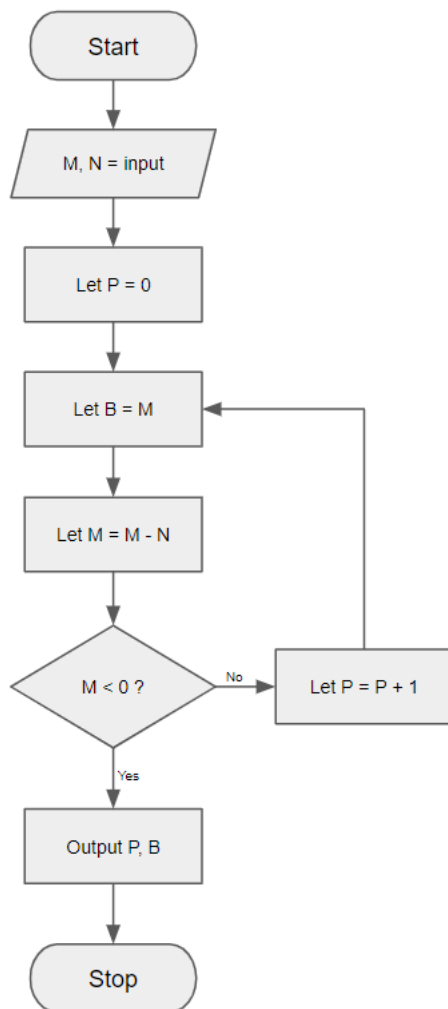Name: ……………………………………………

School: ……………………………………………

Time allowed : 45 min

Total Marks : 30

Answer all FIVE questions in the spaces provided on the question paper

- No calculators are allowed.

1. Consider the following algorithm, represented as a flowchart.

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                    ┌─────────┐
                    │  Start  │
                    └─────────┘
                         │
                         ▼
                   ╱─────────────╱
                  ╱ M, N = input ╱
                 ╱─────────────╱
                         │
                         ▼
                   ┌───────────┐
                   │ Let P = 0 │
                   └───────────┘
                         │
                         ▼
                   ┌───────────┐
                   │ Let B = M │◄──────────────┐
                   └───────────┘               │
                         │                      │
                         ▼                      │
                ┌───────────────┐               │
                │ Let M = M - N │               │
                └───────────────┘               │
                         │                      │
                         ▼                      │
                     �◊          No   ┌─────────────┐
                    ╱ M < 0 ? ╲ ─────────►  │ Let P = P+1 │
                     ╲       ╱               └─────────────┘
                      ╲     ╱
                         │ Yes
                         ▼
                   ┌───────────┐
                   │ Output P,B│
                   └───────────┘
                         │
                         ▼
                    ┌─────────┐
                    │  Stop   │
                    └─────────┘
```

Write a short paragraph explaining what the algorithm does. Be careful to explain clearly what the values M, N, P and B represent. How does the output relate to the input? [6 marks]

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2. Imagine you have a pen and paper, and a calculator that can only do division. Explain how you could use these to calculate the first 1000 primes. [6 marks]

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3. Approximately how many litres of water are there in a swimming pool? State all your assumptions.
[6 marks]

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4. A 12-hour digital clock reads H:M, where H is hours and M is minutes. Using mathematical expressions involving H and M, explain how you could calculate the angle ($\leq 180°$) between the hands of an analogue clock showing the same time. [8 marks]

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5. Adam has Covid-19. Chen does not have Covid-19. Adam is standing too close to Britt. Britt is standing too close to Chen.

Which one of the following statements is correct?

A. It is certainly **true** that that someone with Covid-19 is standing too close to someone without Covid-19.
B. It is certainly **not true** that that someone with Covid-19 is standing too close to someone without Covid-19.
C. It **cannot be determined** whether someone with Covid-19 is standing too close to someone without Covid-19.

Explain. [4 marks]

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