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1 hour 15 minutes

You will need: List of formulae (MF19)

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- If additional space is needed, you should use the lined page at the end of this booklet; the question number or numbers must be clearly shown.
- You should use a calculator where appropriate.
- You must show all necessary working clearly; no marks will be given for unsupported answers from a calculator.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.

- The total mark for this paper is 50.
- The number of marks for each question or part question is shown in brackets [].

- AS & A Level Mathematics
- AS & A Level Physics
- AS & A Level Further Mathematics

1. [YouTube](#) lessons covering past papers, topic-wise practice, exam strategies, and more
2. Dedicated [WhatsApp doubt-solving groups](#) with support from both experts and peers
3. High-quality, reliable resources and guidance throughout your As and A Level preparations
4. Regular motivation and mindset support to help you stay focused and exam-ready

1. A summary of **40** values of y gave the following information where k is a constant:

- Summation of values that are subtraction of k from y is **180**
- Summation of values that are square of those differences is **2500**

(a) Find the standard deviation of these values of y [2]

(b) Find the value of k , given that the mean of these y values is **62** [2]

2. Starbucks is running a promotion where customer get a free drink if their next birthday falls on a Friday. Assume that, for a randomly chosen person, their next birthday is equally likely to occur on any day of the week, independently of others. Out of **420** randomly selected customers, find the probability that at most **50** of them will have their next birthday on a Friday. [5]

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3. The batting strike rates, in runs per **100** balls, of **15** cricket players from two teams, India and Pakistan, are shown below.

India	97	98	104	84	100	109	115	99	122	82	116	96	84	107	91
Pakistan	75	79	94	101	96	77	111	108	83	84	86	115	82	113	95

- (a) Represent the data by drawing a back-to-back stem-and-leaf diagram with team India on the left-hand side and of the diagram and team Pakistan on the right-hand side. [4]
- (b) Find the interquartile range of the strike rates of the players in team India. [2]
- (c) Sahibzada Farhan joins Pakistan's squad as an opener. The mean strike rate of the **16** players in team Pakistan is now **93.9**. Find the strike rate of the new player. [3]

4. Infinity stones from the different universes are to be placed in the four transparent lockers next to each other, one in each locker. The infinity stones come in different colours and stones of the same colour are identical. Calculate how many different arrangements of coloured infinity stones in the four lockers can be made using
- (a) 6 infinity stones, all of different colours [1]
- (b) 4 infinity stones consisting of 2 blue stones, 1 orange stone, and 1 yellow stone [2]
- (c) Thanos has 12 infinity stones consisting of 2 blue, 2 yellow 2 red, 2 purple, 2 orange and 2 green stones. Calculate how many different arrangements of coloured infinity stones in the 4 lockers Thanos can make using any of his 12 infinity stones [7]

5. A game is played during a school farewell party using a six-sided unbiased die with faces numbered **1** to **6**. Two students take turns to play.

In one turn, a player rolls the die repeatedly, up to a maximum of three times. If a **6** appears, the player stops rolling immediately. A player earns **1** point if they obtain a **6** in their turn.

(a) Find the probability that a player scores a point in their one turn. [2]

(b) Rohan and Ryan decide to play this game. Each of them will get three turns.
Find the probability that Ryan scores **2** more points than Rohan. [4]

6. The daily time spent on Instagram by students is believed to follow a normal distribution $N(\mu, \sigma^2)$. A researcher records the Instagram usage in minutes of a random sample of **250** students on a particular day. He finds that:

- **40** students spend less than **80** minutes,
- **30** students spend more than **140** minutes.

(a) Find the value of μ and σ . [5]

(b) Find the probability that a randomly selected student spends between **90** and **130** minutes on Instagram. [3]

(c) The time spent by Padmaja on Instagram is observed for **10** days.

(i) Find the probability that on a given day she spends more than **130** minutes on Instagram. [2]

(ii) Find the probability that Padmaja spends more than **130** minutes on Instagram on at least **7** of these **10** days. [2]

(d) Aman is monitored on daily basis for his Instagram usage. Find the probability that he exceeds **140** minutes of Instagram usage for the second time within the first **5** days. [4]

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