Summary of Key Concepts

Topic	Key Formula / Idea	Example
Grouped Data Mean	$\bar{x} = \frac{\sum(f \times x)}{\sum f}$	Q3
Median Class	Class where cumulative frequency ≥ $n/2$	Q4a
Tree Diagrams	Multiply probabilities along each branch	Q7, Q8
Conditional Prob.	$P(A \mid B) = \frac{P(A \cap B)}{P(B)}$	Q10

5.1 Grouped Data Interpretation

1. Frequency Tables

Question:

The marks of 30 students are grouped as follows:

Marks Range	Frequency
0–10	4
10–20	7
20–30	12
30–40	5
40–50	2

a) How many students scored below 20 marks?

Solution:

$$4(0–10) + 7(10–20) = \boxed{11 \text{ students}}$$

b) What is the modal class?

Solution:

Class with the highest frequency: $\boxed{20–30}$

2. Histograms

Question:

Students recorded the time spent on homework:

Time (min)	Frequency
0–20	5
20–40	8
40–60	10
60–80	7

a) Draw a histogram.

b) Estimate how many students spent 30–50 minutes.

Solution:

- From 20–40 min: $8 \div 2 = 4$ students (30–40)
- From 40–60 min: $10 \div 2 = 5$ students (40–50)

$$\text{Total} = 4 + 5 = \boxed{9 \text{ students}}$$

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3. Mean from Grouped Data

Question:

Estimate the mean time using class midpoints: 10, 30, 50, 70.

Solution:

$$\text{Mean} = \frac{(5 \times 10) + (8 \times 30) + (10 \times 50) + (7 \times 70)}{5 + 8 + 10 + 7} = \frac{1280}{30} = \boxed{42.67 \text{ min}}$$

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4. Cumulative Frequency

Question:

Cumulative frequency for marks:

Marks (≤)	Cumulative Frequency
10	4
20	11
30	23
40	28
50	30

a) What is the median class?

Solution:

Median position = $30 \div 2 = 15$

First class to reach 15 is $\boxed{20–30}$

5.2 Probability (Including Tree Diagrams)

5. Basic Probability

Question:

A bag contains 4 red, 3 blue, and 5 green marbles. What is the probability of drawing a red one?

Solution:

$$P(\text{Red}) = \frac{4}{4+3+5} = \frac{4}{12} = \boxed{\frac{1}{3}}$$

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6. Independent Events

Question:

A coin is flipped twice. What is the probability of getting two tails?

Solution:

$$P(\text{T and T}) = \frac{1}{2} \times \frac{1}{2} = \boxed{\frac{1}{4}}$$

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7. Tree Diagram (With Replacement)

Question:

A bag has 3 black and 2 white balls. Two are drawn *with replacement*. Find the probability both are white.

Solution:

$$P(\text{WW}) = \frac{2}{5} \times \frac{2}{5} = \boxed{\frac{4}{25}}$$

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8. Tree Diagram (Without Replacement)

Question:

Two cards are drawn from a 52-card deck without replacement. Find the probability both are Kings.

Solution:

$$P = \frac{4}{52} \times \frac{3}{51} = \boxed{\frac{1}{221}}$$

9. Combined Events

Question:

60% of a class are girls, and 20% of the girls wear glasses. What's the probability of selecting a girl who wears glasses?

Solution:

$$P = 0.6 \times 0.2 = \boxed{0.12 \text{ or } 12\%}$$

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10. Conditional Probability

Question:

In a school, 30% of students play football, and 10% play both football and basketball. What is the probability that a football player also plays basketball?

Solution:

$$P(\text{Basketball} \mid \text{Football}) = \frac{0.10}{0.30} = \boxed{\frac{1}{3}}$$

Mixed Practice

11. Grouped Data + Probability

Question:

In a survey of 100 people:

Height (cm)	Frequency
150–160	15
160–170	25
170–180	40
180–190	20

What is the probability a randomly selected person is 160–180 cm tall?

Solution:

$$P = \frac{25 + 40}{100} = \boxed{0.65}$$
