Probability: Venn Diagrams & the Addition Rule (Grade 10)

MEMORANDUM

Name: ..... Class: .....

Date: .....

MARK ____ / 22

Answer all questions. Show all your working — marks are awarded for method as well as the final answer. **Teacher copy: accept any correct equivalent method.**

1 A fair die is rolled. Find P(rolling a 4). **(1)**

$\frac{1}{6}$ ✓ (1)

2 Find P(rolling an even number) on a fair die. **(1)**

$\frac{3}{6} = \frac{1}{2}$ ✓ (1)

3 If P(A) = 0,3 find P(not A). **(1)**

$1 - 0{,}3 = \mathbf{0{,}7}$ ✓ (1)

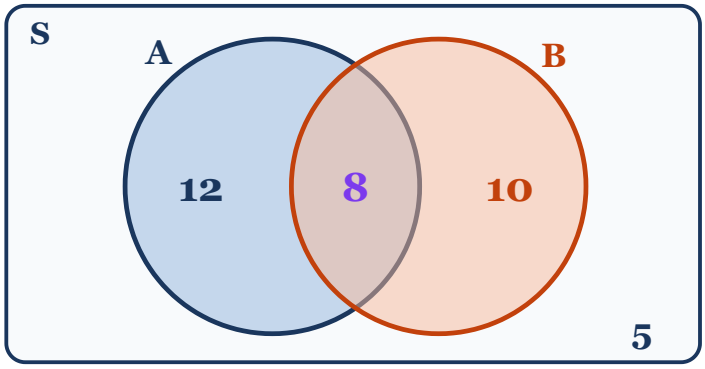
4 State the addition rule. **(2)**

P(A or B) = P(A) + P(B) − P(A and B) ✓✓ (2)

5 If A and B are mutually exclusive, what is P(A and B)? **(1)**

0 ✓ (1)

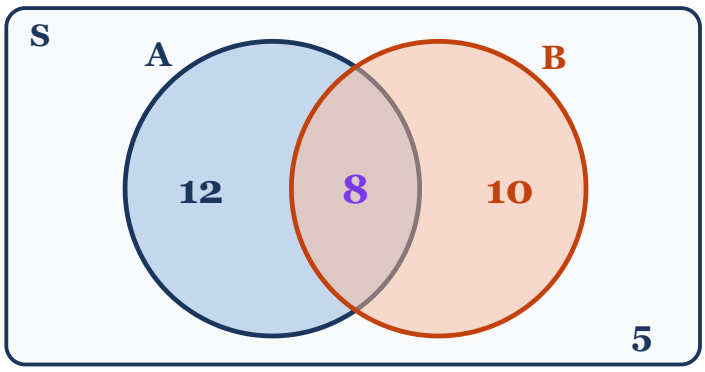
6 From the Venn diagram, find P(A and B). (2)



$n(\text{S}) = 35 \cdot n(\text{A}) = 20 \cdot n(\text{B}) = 18 \cdot n(\text{A and B}) = 8$

$\frac{8}{35}$ ✓✓ (2)

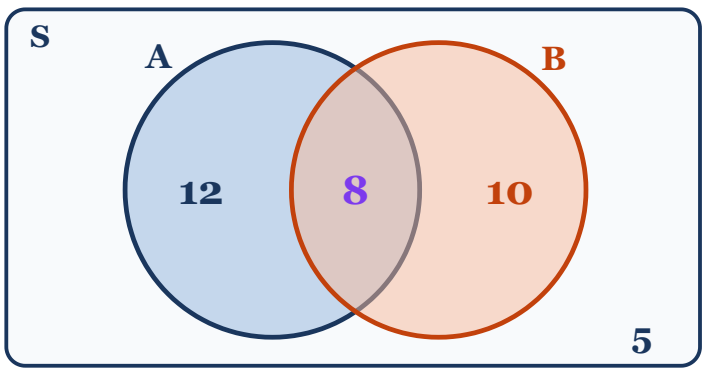
7 From the Venn diagram, find P(A or B). (2)



$n(\text{S}) = 35 \cdot n(\text{A}) = 20 \cdot n(\text{B}) = 18 \cdot n(\text{A and B}) = 8$

$\frac{30}{35} = \frac{6}{7}$ ✓✓ (2)

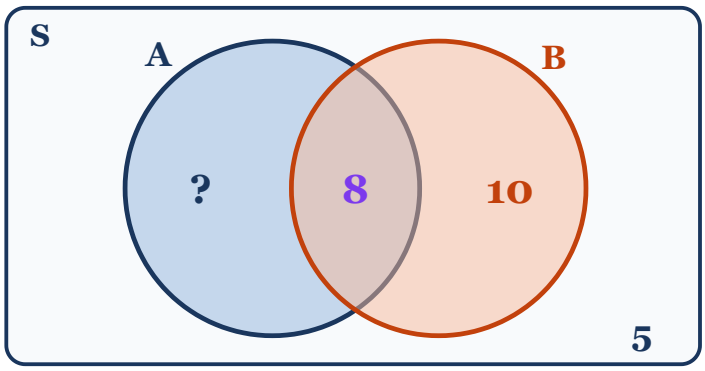
8 From the Venn diagram, find P(neither A nor B). (2)



$n(\text{S}) = 35 \cdot n(\text{A}) = 20 \cdot n(\text{B}) = 18 \cdot n(\text{A and B}) = 8$

$\frac{5}{35} = \frac{1}{7}$ ✓✓ (2)

9 $n(\text{A}) = 20$ and 8 are in both. How many take ONLY A? (2)



$n(\text{S}) = 35 \cdot n(\text{A}) = 20 \cdot n(\text{B}) = 18 \cdot n(\text{A and B}) = 8$

$20 - 8 = \mathbf{12}$ ✓✓ (2)

10 A die is rolled 90 times and a 5 comes up 12 times. Calculate the relative frequency of rolling a 5. (2)

$\frac{12}{90}$ ✓ $= \frac{2}{15} \approx 0{,}13$ ✓ (2)

11 For that same die, write down the theoretical probability of rolling a 5 and comment on the difference. (2)

$\frac{1}{6} \approx 0{,}17$ ✓; the relative frequency $0{,}13$ is a little lower, which is normal variation over only 90 rolls ✓ (2)

12 What generally happens to the relative frequency as the number of trials becomes very large? (2)

It tends to settle close to the theoretical probability ✓ — though it need not move closer after every single trial, because chance variation remains ✓ (2)

13 Give ONE example of a situation where the probability CANNOT be found by counting equally likely outcomes, and say why. (2)

Dropping a drawing pin or a bottle top ✓ — the outcomes are not equally likely, so there are no equal outcomes to count; the probability is estimated from an experiment instead (relative frequency) ✓ (2)

TOTAL: 22 marks

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