Assessment schedule: practice paper 2026

AS 91585 Apply probability concepts in solving problems · Vertex Academy practice paper, not an NZQA paper

QUESTION ONE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	all three = 90 two only: 150, 210, 130 B only = 420 − 150 − 130 − 90 = 50 J only = 610 − 150 − 210 − 90 = 160 G only = 880 − 210 − 130 − 90 = 450 exactly one = 50 + 160 + 450 = 660 P(exactly one) = $\frac{660}{1500}$ = 0.44	Venn diagram correctly displaying the data, OR correct probability 0.44.		
(b)	P(B) = $\frac{420}{1500}$ = 0.28 P(B 0.3934 ≠ 0.28, so not independent P(B and J) = 0.16 ≠ 0, so not mutually exclusive Not independent (jet boat riders more likely to bungy), not mutually exclusive	One relevant probability correct, e.g. P(B | J) = 0.3934 or P(B) × P(J) = 0.1139.	Correct comparison showing the events are not independent AND not mutually exclusive, interpreted in context.	
(c)	two only: 150 + 210 + 130 = 490 at least two = 490 + 90 = 580 P(all three P(G 0.5238 > 0.5, so the claim is supported (only just)	One correct probability: 0.1552 OR 0.5238.	Both probabilities correct AND the claim judged as supported, with the reason.	
(d)	P(online and no-show) = 0.35 × 0.06 = 0.021 P(i-SITE and no-show) = 0.65 × 0.02 = 0.013 P(no-show) = 0.021 + 0.013 = 0.034 P(online RR = $\frac{0.06}{0.02}$ = 3 61.8% of no-shows are online although 65% of bookings are i-SITE: the higher risk outweighs the smaller share	P(no-show) = 0.034 correctly calculated.	P(online | no-show) = 0.6176.	P(online | no-show) = 0.6176 AND the statement explained by comparing the risks (online three times as likely) with the shares of bookings (35% against 65%).

(e)	P(all 13 turn up) = $(1 - 0.034)^{13} = 0.966^{13} = 0.6378$ $0.6378 > 0.5$ online: $0.94^{13} = 0.4474 < 0.5$ groups act together, e.g. 4 groups: $0.94^4 = 0.7807$ Independence fails for groups, so the risk is underestimated; overbooking is riskier than calculated	$0.966^{13} = 0.6378$ OR $0.94^{13} = 0.4474$ calculated.	Both probabilities correct AND compared with 0.5, OR one correct with the independence assumption stated in context.	Both probabilities correct, advice given, AND discussion of how groups break independence and make all 13 turning up more likely, so the risk is underestimated.

QUESTION TWO

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	152 + 216 + 38 = 406 check: 2000 − 1594 = 406 P = $\frac{406}{2000} = 0.203$	Correct probability 0.203.		
(b)	P(indicates P(risk goods 0.4130 < 0.5 A supported; B not supported (58.7% of indicated bags had no risk goods)	One correct conditional probability: 0.8 OR 0.4130.	Both conditional probabilities correct AND each claim correctly judged with a reason.	
(c)	risk(road) = $\frac{48}{480} = 0.10$ risk(lane) = $\frac{18}{360} = 0.05$ RR = $\frac{0.10}{0.05} = 2$ Road riders twice as likely to be injured; observational, so other differences (e.g. distance ridden) could explain it	One risk correctly calculated, OR a valid reason the study cannot show cause.	Relative risk of 2 correct AND correctly interpreted in context (twice as likely), with a valid reason the study cannot show cause.	
(d)	risk(road) = $\frac{48}{480} = 0.10$, risk(lane) = $\frac{18}{360} = 0.05$, RR = 2 480 × 0.05 = 24 weekly km: lane 360 × 45 = 16 200, road 480 × 90 = 43 200 per 1000 weekly km: lane $\frac{18}{16}$ 200 × 1000 = 1.11, road $\frac{48}{43}$ 200 × 1000 = 1.11 Same risk per km: distance explains the RR of 2, so the report is not supported (observational, causation assumed)	Relative risk of 2 calculated.	Injury rates per distance ridden calculated for both groups, OR distance identified as a confounder with a supporting calculation.	Rates per distance shown to be equal AND the report evaluated: the doubling is explained by distance, and the '24 prevented' claim wrongly assumes the road causes the injuries.

(e)	false indication rate = $\frac{216}{1810} = 0.1193$ P(indicates) = 0.02 × 0.8 + 0.98 × 0.1193 = 0.1330 P(risk P(risk and both flag) = 0.0144, P(no risk and both flag) = 0.0058 P(risk P(not opened	False indication rate 0.1193 OR P(indicates) = 0.1330 found.	P(risk goods | indicates) = 0.1203, OR P(risk goods | opened) = 0.7112.	P(risk goods | opened) = 0.7112 AND P(not opened | risk goods) = 0.28, with the independence assumption stated in context AND the system evaluated (fewer false searches against more missed risk bags).

QUESTION THREE

Part	Evidence	Achievement (u)	Merit (r)	Excellence (t)
(a)	0.42 + 0.28 + 0.15 + 0.08 = 0.93 k = 1 − 0.93 = 0.07 P(X ≥ 3) = 0.15 + 0.08 + 0.07 k = 0.07, P(X ≥ 3) = 0.30	k = 0.07 AND P(X ≥ 3) = 0.30.		
(b)	P(X = 1) = 0.42, P(X ≥ 3) = 0.30 $\frac{0.42}{0.30} = 1.4 \neq 2$ P(X ≥ 2) = 1 − 0.42 = 0.58 P(X = 2 0.4828 < 0.5	P(X ≥ 3) = 0.30 used in Claim 1, OR P(X = 2 | X ≥ 2) = 0.4828.	Both claims correctly judged as not supported, with 1.4 (or 0.42 against 0.60) AND 0.4828 as evidence.	
(c)	more than 15: 7 + 4 + 2 + 2 = 15 trials P(more than 15) ≈ $\frac{15}{40} = 0.375$ within 12: 6 + 10 = 16 trials, P ≈ $\frac{16}{40} = 0.4$ 0.4 < 0.5 Not supported, but 40 trials is few (margin about ±0.16); run more trials	One correct estimate: 0.375 OR 0.4.	Both estimates correct AND the claim judged not supported, with a comment on the small number of trials or the equally likely assumption.	

(d)	true = $\frac{9000}{90}$ 000 = 0.1 model = $\frac{1}{6}$ = 0.1667 experimental = $\frac{6}{75}$ = 0.08 model too high (assumption wrong); experimental close but small sample True probability most reliable; simulation underestimates boxes needed, so the claim is even less likely	All three probabilities correctly calculated (0.1, 0.1667, 0.08).	All three compared, with a reason for the difference between the model and the true probability, or the size of the class sample.	All three compared AND the true probability justified as most reliable in context AND the effect on the simulation explained (more boxes needed, so the claim is even less likely).
(e)	P(kākāpō) = 0.1, others 0.18 each one trial: generate numbers until all six birds appear; record the count P(at least one in 12) = $1 - 0.9^{12} = 0.7176$ model: $1 - (\frac{5}{6})^{12} = 0.8878$ $0.9^n \le 0.05$, $n \ge \log 0.05 \div \log 0.9 = 28.43$ Claim not supported (0.7176 < 0.95); 29 boxes needed	Correct allocation of random numbers to the six cards, OR $1 - 0.9^{12} = 0.7176$.	A complete trial described (stopping rule and what is recorded), OR 0.7176 compared with 0.95 and the claim judged.	Claim evaluated with both the true (0.7176) and model (0.8878) probabilities AND 29 boxes found AND the independence assumption stated in context.

Judgement for each question

N0	N1	N2	A3	A4	M5	M6	E7	E8
No response; no relevant evidence.	Attempts at least one part of the question.	1 of u	2 of u	3 of u	1 of r	2 of r	1 of t	2 of t

Grade score out of 24 (each question's grade: N0 = 0 to E8 = 8): Not Achieved 0 to 6, Achieved 7 to 13, Merit 14 to 18, Excellence 19 to 24 (the 2025 exam's cut scores).