

PROBABILITY

Solutions

DBE's own marking guidelines, in booklet order

Every solution here is a clip of the official DBE marking guideline published with the paper the question came from. The working, the mark ticks and the accepted alternatives are DBE's. Nothing has been rewritten or re-derived.

The numbers match the question booklet: solution 34 answers question 34, and the chapters are in the same order.

DBE writes one guideline for both languages, so these pages are bilingual and their marking notes are largely in English. That is DBE's own page, reproduced as printed.

A marking guideline is written for markers, not learners. It shows the shortest route to the marks, so where a step looks compressed, that is the guideline being terse rather than a step missing.

1. Mutually exclusive events, then a dice and a card together

Official DBE marking guideline · May/June 2025 · Q10 · 8 marks

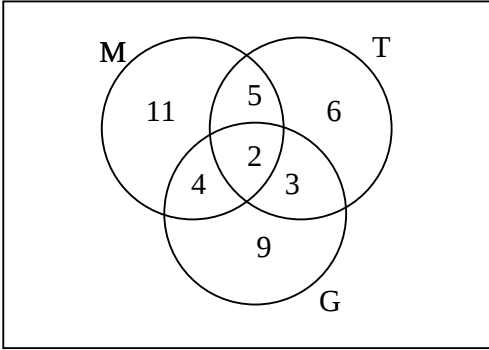
QUESTION/VRAG 10

10.1	$P(A \text{ or } B) = P(A) + P(B)$ $P(B) = P(A \text{ or } B) - P(A)$ $= 0,79 - 0,42$ $= 0,37$	✓ substitution ✓ answer (2)
10.2	People pay: R2 600 $0,7 \times R2\ 600 = R1\ 820$ Total value of pay-outs = R2 600 – R1 820 = R780 $P(\text{someone to win}) = \frac{16}{52} \times \frac{1}{2}$ $= \frac{2}{13}$ Total number of people winning = $\frac{2}{13} \times 260$ = 40 $\therefore$ Pay-out = $\frac{R780}{40}$ = R19,50 per person winning OR/OF People pay: R2 600 Total value of pay-outs = $0,3 \times R2\ 600$ = R780 $P(\text{someone to win}) = \frac{16}{52} \times \frac{1}{2}$ $= \frac{2}{13}$ Total number of people winning = $\frac{2}{13} \times 260$ = 40 $\therefore$ Pay-out = $\frac{R780}{40}$ = R19,50 per person winning	✓ R1 820 ✓ amount willing to pay-out ✓ $\frac{16}{52}$ ✓ $\frac{2}{13}$ ✓ winners ✓ pay-out (6) OR/OF ✓ $0,3 \times R2\ 600$ ✓ amount willing to pay-out ✓ $\frac{16}{52}$ ✓ $\frac{2}{13}$ ✓ winners ✓ pay-out (6)
		[8]

2. Three examinations in one Venn diagram

Official DBE marking guideline · November 2024 · Q11 · 9 marks

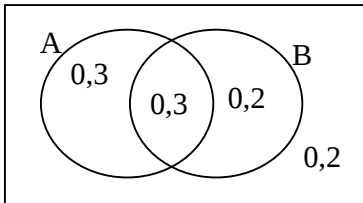
QUESTION/VRAAG 11

11.1		✓2 ✓3 ; 4 ; 5 ✓6 ; 9 ; 11 (3)
11.2	$P(\text{at least two subjects}) = \frac{4 + 2 + 5 + 3}{40} = \frac{14}{40} = \frac{7}{20} = 0,35$	✓ (4 + 2 + 5 + 3) or 14 in numerator ✓ 40 in denominator (2)
11.3	$P(M) \times P(T) = \frac{22}{40} \times \frac{16}{40} = \frac{11}{50} = 0,22$ $P(M \text{ and } T) = \frac{7}{40} = 0,175$ $P(M) \times P(T) \neq P(M \text{ and } T)$ Events M and T are not independent	✓ $\frac{22}{40} \times \frac{16}{40}$ ✓ $\frac{11}{50}$ ✓ $\frac{7}{40}$ ✓ answer (4)
		[9]

3. Independent or mutually exclusive? Then twelve books on a shelf

Official DBE marking guideline · November 2021 · Q12 · 14 marks

QUESTION/VRAAG 12

12.1.1	No, because $P(A \text{ and } B) \neq 0$	✓ answer and reason (1)								
12.1.2(a)	$P(A \text{ and } B) = 0,3$ $P(\text{only } B) = 0,2$ $P(A \text{ and } B) = P(A) \times P(B)$ $0,3 = P(A) \times 0,5$ $P(A) = 0,6$ $P(\text{only } A) = 0,3$	✓ $P(A \text{ and } B) = P(A) \times P(B)$ ✓ 0,5 ✓ $P(A) = 0,6$ ✓ answer (4)								
12.1.2(b)	 $P(\text{not } A \text{ or not } B) = 0,2 + 0,2 + 0,3 = 0,7$ OR/OF $P(\text{not } A \text{ or not } B) = 1 - P(A \text{ and } B) = 1 - 0,3 = 0,7$ OR/OF $P(A' \text{ or } B') = P(A') + P(B') - P(A' \text{ and } B')$ $= 0,4 + 0,5 - 0,2 = 0,7$	✓ method ✓ answer (2) OR/OF ✓ method ✓ answer (2) OR/OF ✓ method ✓ answer (2)								
12.2.1	$P(\text{novel}) = \frac{3}{12} = \frac{1}{4}$	✓ answer (1)								
12.2.2	$12! = 479\,001\,600$	✓✓ answer (2)								
12.2.3	<table border="1"><tr><td>5</td><td>3!</td><td>8!</td><td>4</td></tr><tr><td>(Poetry)</td><td>(Novels all together)</td><td>(Arrangements of rest of the books including the novels)</td><td>(Drama)</td></tr></table> $P(\text{start with poetry, end with drama AND all novels together})$ $= \frac{5 \times 3! \times 8! \times 4}{12!}$ $= \frac{1}{99}$	5	3!	8!	4	(Poetry)	(Novels all together)	(Arrangements of rest of the books including the novels)	(Drama)	✓ 5×4 ✓ $3! = 6$ ✓ $8!$ ✓ $\frac{5 \times 3! \times 8! \times 4}{12!} = \frac{1}{99}$ (A) (4)
5	3!	8!	4							
(Poetry)	(Novels all together)	(Arrangements of rest of the books including the novels)	(Drama)							
		[14]								

TOTAL/TOTAAL: 150

4. P(B) from mutually exclusive events, then what a learner buys

Official DBE marking guideline · May/June 2024 · Q11 · 14 marks

QUESTION 11/VRAAG 11

11.1	$P(A) + P(B) = 0,52$ $0,4 + P(B) = 0,52$ $P(B) = 0,12$	✓ substitution ✓ answer (2)
11.2.1	$P(\text{sandwich}) = \frac{4}{25}$ OR/OF $0,02 + 0,01 + 0,04 + 0,09 = \frac{4}{25} = 0,16$	✓ answer (1) OR/OF ✓ answer (1)
11.2.2	$P(\text{at least two events}) = 0,02 + 0,01 + 0,03 + 0,04$ $= 0,1$	✓ $0,02 + 0,01 + 0,03 + 0,04$ ✓ answer (2)
11.2.3	$P(\text{not any}) = 1 - (0,1 + 0,04 + 0,09 + 0,2)$ $= 0,57$	✓ $1 - (0,1 + 0,04 + 0,09 + 0,2)$ ✓ answer (2)
11.3.1	$7! = 5040$	✓ $7!$ (1)
11.3.2	$P(4 \text{ players alphabetically}) = \frac{1}{7 \times 6 \times 5 \times 4} = \frac{1}{840}$	✓ 1 ✓ 840 ✓ $\frac{1}{840}$ (3)

11.3.3	<table><tr><td></td><td>F</td><td></td><td>F</td><td></td><td>F</td><td></td><td>F</td><td></td></tr></table> F arrangements: 4! M arrangements: 5 options with 3 males = $5 \times 4 \times 3$ $4! \times 5 \times 4 \times 3$ = 1 440 OR/OF 10 Options: F M F M F M F M F M F M F F F F M F M F M F M F M F F M M F M F F M F M F M F F F M F M F F M F M M F F M F F M M F F M F M F M F F F M F M Hence $10 \times 4! \times 3! = 1440$		F		F		F		F		✓4! ✓$5 \times 4 \times 3$ ✓1 440 (3) OR/OF ✓$4! \times 3!$ ✓$\times 10$ ✓1 440 (3)
	F		F		F		F				
		[14]									
	TOTAL/TOTAAL: 150										

5. Independent events, then a survey of 150 learners

Official DBE marking guideline · May/June 2021 · Q11 · 15 marks

QUESTION/VRAAG 11

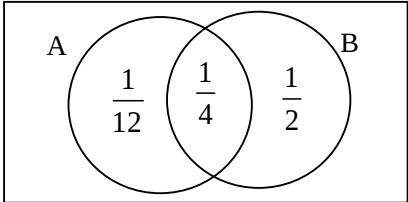
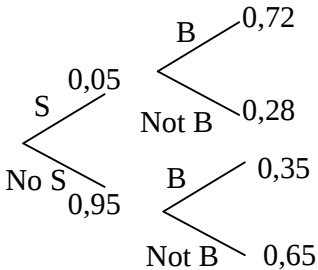
11.1	$P(A) = 1 - P(\text{not } A) = 0,6$ $P(A \text{ and } B) = P(A) \times P(B)$ $= 0,6 \times 0,3$ $= \frac{9}{50}$ $= 0,18$	✓ 0,6 ✓ $P(A \text{ and } B) = P(A) \times P(B)$ ✓ answer (A) (3)
11.2.1	$a = \frac{15}{150} = 0,1$	✓ $\frac{15}{150}$ (A) (1)
11.2.2	$m = 1 - 0,7 = 0,3$	✓ 0,3 (A) (1)
11.2.3	$0,24 + 0,14 + 0,02 + 0,12 + 0,1 + 2b = 0,7$ $2b = 0,08$ $b = 0,04$ $0,04 \times 150 = 6$	✓ addition ✓ simplification ✓ $b = 0,04$ ✓ 6 (4)
11.3.1	$9 \times 9 \times 8 = 648$	✓9 ✓ 9×8 (2)
11.3.2	$2 \times 8 \times 4 = 64$ $2 \times 8 \times 5 = 80$ Total number = $64 + 80 = 144$	✓✓ $2 \times 8 \times 4$ ✓ $2 \times 8 \times 5$ ✓144 (A) (4)
		[15]

TOTAL/TOTAAL: 150

6. At least one event occurring, then snow on the Drakensberg

Official DBE marking guideline · November 2023 · Q10 · 15 marks

QUESTION 10/VRAAG 10

10.1.1	$P(A \text{ and } B) = P(A) \times P(B)$ $= \frac{1}{3} \times \frac{3}{4}$ $= \frac{1}{4}$	$\checkmark \frac{1}{3} \times \frac{3}{4}$ $\checkmark \frac{1}{4}$ (2)
10.1.2	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $= \frac{1}{3} + \frac{3}{4} - \frac{1}{4}$ $= \frac{5}{6}$ OR/OF  $P(A \text{ or } B) = \frac{1}{12} + \frac{1}{4} + \frac{1}{2} = \frac{5}{6}$	$\checkmark \text{ substitution}$ $\checkmark \text{ answer}$ (2) OR/OF $\checkmark \text{ substitution}$ $\checkmark \text{ answer}$ (2)
10.2.1		$\checkmark \text{ branch 1 with probabilities}$ $\checkmark \text{ branch 2 with probabilities}$ $\checkmark \text{ branch 3 with probabilities}$ (3)
10.2.2	$P(\text{NOT below } 0^\circ)$ $= P(S; \text{NOT below } 0^\circ) + P(NS; \text{NOT below } 0^\circ)$ $= 0,05 \times 0,28 + 0,95 \times 0,65$ $= 0,6315$	$\checkmark \text{ value of } P(S; \text{NOT below } 0^\circ)$ $\checkmark \text{ value of } P(NS; \text{NOT below } 0^\circ)$ $\checkmark \text{ answer}$ (3)
10.3.1	$n(S) = 10!$	$\checkmark 10!$ (1)

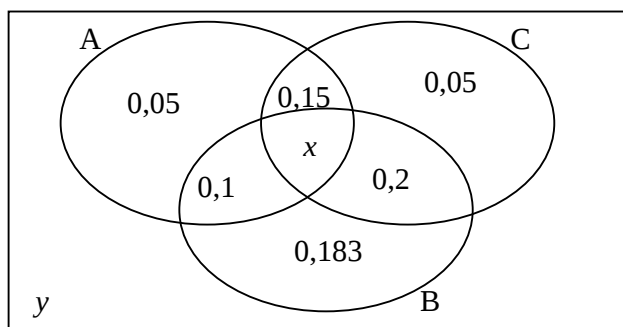
10.3.2	4 Options; $2 \times 8 \times 7 \times 6 \times 5 \times 4 \times 1 \times 3 \times 2 \times 1 = 80\,640$ $8 \times 2 \times 7 \times 6 \times 5 \times 4 \times 3 \times 1 \times 2 \times 1 = 80\,640$ $8 \times 7 \times 2 \times 6 \times 5 \times 4 \times 3 \times 1 \times 1 \times 1 = 80\,640$ $8 \times 7 \times 6 \times 2 \times 5 \times 4 \times 3 \times 2 \times 1 \times 1 = 80\,640$ Total number of possibilities = 322 560 $P(5 \text{ learners in between}) = \frac{322\,560}{10!} = \frac{4}{45}$ OR/OF $2 \times 8 \times 7 \times 6 \times 5 \times 4 \times 1 \times 3 \times 2 \times 1$ 4 possible starting positions $\therefore 4(2 \times 8! \times 1) = 322\,560$ $8(8!) = 322\,560$ $P(5 \text{ learners in between}) = \frac{322\,560}{10!} = \frac{4}{45}$	✓ (2×8!) ✓✓ 4(2 × 8!) or 322 560 ✓ $\frac{322\,560}{n(S)}$ (4) OR/OF ✓ (2×8!) ✓✓ 4(2 × 8!) or 322 560 ✓ $\frac{322\,560}{n(S)}$ (4) [15]
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TOTAL/TOTAAL: 150

7. Three events in a Venn diagram, with two unknowns to find

Official DBE marking guideline · November 2022 · Q10 · 17 marks

QUESTION 10/VRAAG 10



10.1.1(a)	$y = 1 - 0,893 = 0,107 \text{ (0,11)}$	✓ $y = 1 - 0,893$ (1)
10.1.1(b)	$x = 0,893 - 0,733$ $= 0,16$	✓ $x = 0,893 - 0,733$ (1)
10.1.2	$P(\text{at least 2 events}) = 0,1 + 0,15 + 0,16 + 0,2$ $= 0,61$ Answer only: Full Marks	✓ values ✓ answer (2)
10.1.3	$P(B) = 0,643$ $P(C) = 0,56$ $P(B \text{ and } C) = 0,36$ $P(B) \times P(C) = 0,643 \times 0,56 = 0,36$ $\therefore P(B \text{ and } C) = P(B) \times P(C)$ $\therefore B \text{ and } C \text{ are independent}$	✓ $P(B) = 0,643$ ✓ $P(C) = 0,56$ ✓ $P(B \text{ and } C) = 0,36$ ✓ $P(B) \times P(C) = 0,36$ ✓ independent because $P(B \text{ and } C) = P(B) \times P(C)$ (5)
10.2.1	$7 \times 6 \times 5 \times 4 = 840$	✓ 4 ✓ 7 ✓ $7 \times 6 \times 5 \times 4 = 840$ (3)
10.2.2	start with 5, 7, 9 or start with 6 or start with 8 $(3 \times 5 \times 1 \times 3) + (1 \times 5 \times 1 \times 2) + (1 \times 5 \times 1 \times 2)$ $= 45 + 10 + 10$ $= 65$ $P = \frac{65}{840} = \frac{13}{168} = 0,08$ OR/OF ends in 4 or ends in 6 or ends in 8 $(5 \times 5 \times 1 \times 1) + (4 \times 5 \times 1 \times 1) + (4 \times 5 \times 1 \times 1)$ $= 25 + 20 + 20$ $= 65$ $P = \frac{65}{840} = \frac{13}{168} = 0,08$	✓ $(3 \times 5 \times 1 \times 3) = 45$ ✓ $(1 \times 5 \times 1 \times 2) = 10$ ✓ $(1 \times 5 \times 1 \times 2) = 10$ ✓ 65 ✓ answer (5) OR/OF ✓ $(5 \times 5 \times 1 \times 1) = 25$ ✓ $(4 \times 5 \times 1 \times 1) = 20$ ✓ $(4 \times 5 \times 1 \times 1) = 20$ ✓ 65 ✓ answer (5)
		[17]

TOTAL/TOTAAL: 150

8. Three-digit numbers from 501 to 999

Official DBE marking guideline · May/June 2025 · Q11 · 7 marks

QUESTION/VRAAG 11

11.1	$\frac{1}{5} \times \frac{9}{9} \times \frac{9}{9} = 81$ 500 cannot be included $\therefore$ 80 possibilities $\frac{4}{5} \times \frac{1}{9} \times \frac{9}{9} = 36$ $\frac{4}{9} \times \frac{9}{5} \times \frac{1}{9} = 36$ Total possibilities $= 80 + 36 + 36$ $= 152$ OR 501 to 599: $99 - 10 - 9 = 80$ possibilities 601 to 699: $9 + 9 = 18$ possibilities of having a 5 in the 10's digit or units digit. Thus 601 to 699 $= 4 \times 18$ Total possibilities $= 4 \times 18 + 80$ $= 152$	✓ $1 \times 9 \times 9$ ✓ $4 \times 1 \times 9$ ✓ $4 \times 9 \times 1$ ✓ 152 (4) ✓ 80 ✓ 18 ✓ 4×18 ✓ 152 (4)
11.2	P(not having such a number) $= 1 - \frac{152}{499}$ $= \frac{347}{499}$ $= 0,70$	✓ $n(S) = 499$ ✓ $1 - P(\text{having number})$ ✓ numerator (3)
		[7]

TOTAL/TOTAAL: 150

9. A four-character code, with repetition and without

Official DBE marking guideline · November 2024 · Q12 · 8 marks

QUESTION/VRAAG 12

12.1	$26 \times 10 \times 26 \times 10 = 67\ 600$	✓for correct letters ✓for correct digits (2)
12.2	$18 \times 9 \times 19 \times 5 = 15\ 390$	Given that its multiplication ✓ 18 ✓ 19 ✓ 9 ✓ 5 (4)
12.3	$24 \times 9 \times 25 \times 5 = 27\ 000$ $\frac{27\ 000 - 15\ 390}{15\ 390} \times 100 = 75,44\%$	✓ $24 \times 9 \times 25 \times 5$ ✓ answer (2)
		[8]

TOTAL/TOTAAL: 150

10. Seven flags in a row, and the chance they fall by continent

Official DBE marking guideline · May/June 2022 · Q10 · 13 marks

QUESTION/VRAAG 10

10.1.1	$7! = 5\,040$	✓✓ answer (2)
10.1.2	$4! \times 4!$ $= 576$ $P(\text{African flags together}) = \frac{576}{5040} \left(= \frac{4}{35} = 0,11 \right)$	✓ $4!$ ✓ $4! \times 4!$ ✓ answer (A) (3)
10.2	$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $0,88 = 0,4 + P(B) - P(A \text{ and } B)$ $0,88 = 0,4 + P(B) - 0,4P(B)$ $0,48 = 0,6P(B)$ $P(B) = 0,8$	✓ subs into rule ✓ $P(A \text{ and } B) = 0,4P(B)$ ✓ answer (3)
10.3	First Passenger Second Passenger Probability of first passenger choosing meat $= \frac{x}{120}$ Probability of second passenger choosing cheese $= \frac{120-x}{119}$ $\frac{x}{120} \times \frac{120-x}{119} = \frac{18}{85}$ $120x - x^2 = 3\,024$ $x^2 - 120x + 3\,024 = 0$ $(x-84)(x-36) = 0$ $x = 84 \quad \text{or} \quad x = 36$ $\therefore P(1^{\text{st}} \text{ cheese}) = \frac{36}{120} = \frac{3}{10}$	 ✓ $\frac{x}{120}$ ✓ $\frac{120-x}{119}$ ✓ $\frac{x}{120} \times \frac{120-x}{119} = \frac{18}{85}$ ✓ $x = 84 \quad \text{or} \quad x = 36$ ✓ $\frac{3}{10}$ (5)
		[13]

TOTAL/TOTAAL: 150