SA-STUDENT

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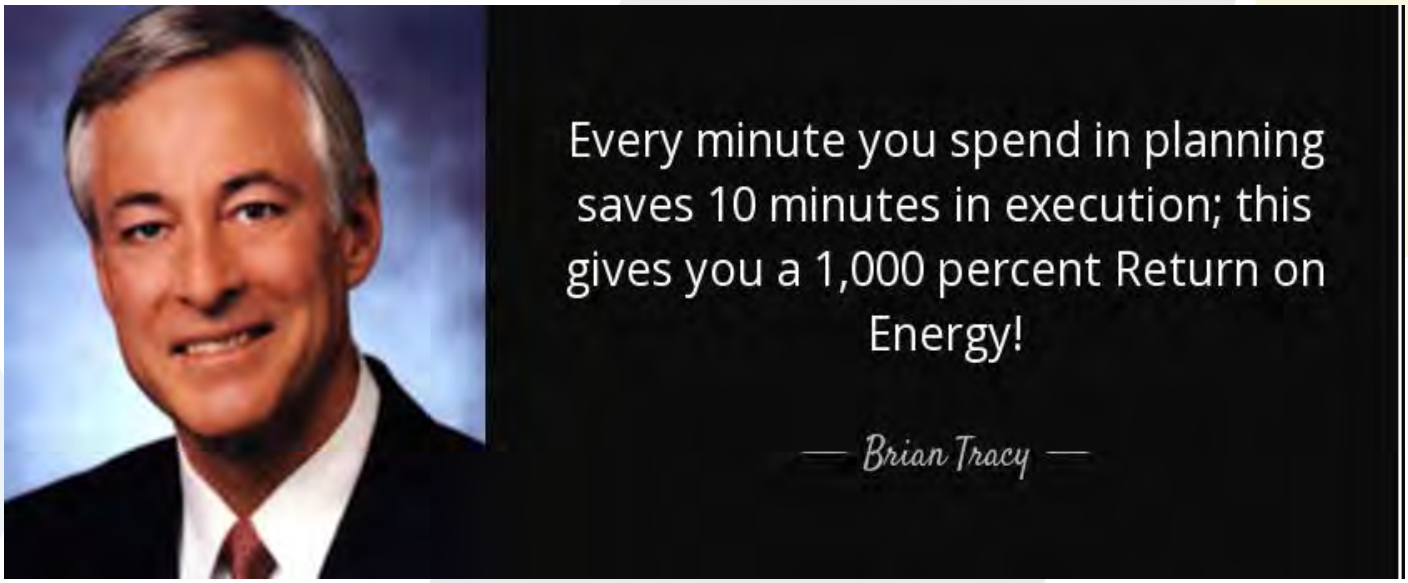
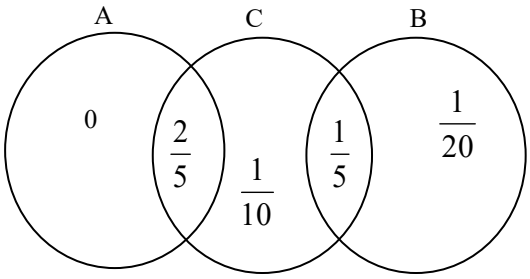
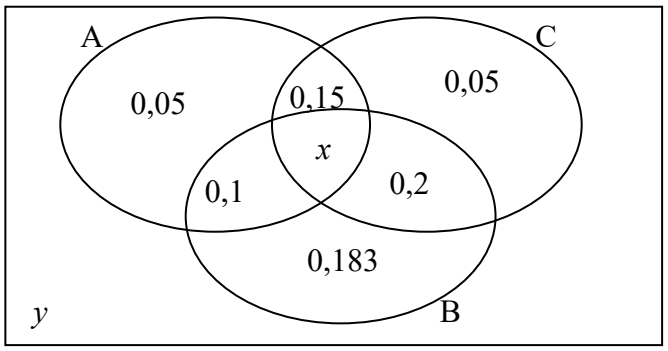


10.2.2	P(B and C) = $\frac{1}{5} = 0,2$ P(only C) = $\frac{7}{10} - \frac{2}{5} - \frac{1}{5} = \frac{1}{10} = 0,1$  	✓ P(B and C) = $\frac{1}{5}$ (A) ✓ $\frac{7}{10} - \frac{2}{5} - \frac{1}{5}$ ✓ $\frac{1}{10}$ (3)
10.2.3	P(no event) = $1 - \left(\frac{2}{5} + \frac{1}{10} + \frac{1}{5} + \frac{1}{20}\right) = \frac{1}{4} = 0,25$	✓1 – (P(A) or P(B) or P(C)) ✓answer (2)
10.3.1	3! × 5! = 720 Answer only: Full Marks	✓ 3! ✓ 3! × 5! (A) (2)
10.3.2	$\frac{7! - 6! \times 2}{7!} = \frac{5}{7} = 0,71$ **OR/*OF*** $1 - \frac{6! \times 2}{7!}$ $= 1 - \frac{2}{7}$ $= \frac{5}{7} = 0,71$	✓ $7! - 6! \times 2$ ✓ denominator (7!) ✓ answer (3) **OR/*OF*** ✓ $6! \times 2$ ✓ denominator (7!) ✓ answer (3)
		[17]

TOTAL/*TOTAAL*: 150

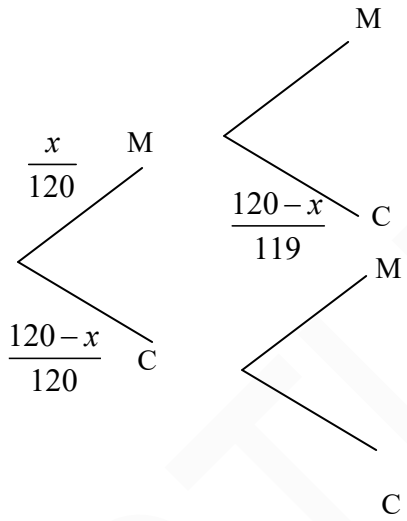
QUESTION 10/*VRAAG* 10



10.1.1(a)	$y = 1 - 0,893 = 0,107$ (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(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 and C) = 0,36 P(B) × P(C) = 0,643 × 0,56 = 0,36 ∴ P(B and C) = P(B) × P(C) ∴ B and C are independent	✓ P(B) = 0,643 ✓ P(C) = 0,56 ✓ P(B and C) = 0,36 ✓ P(B) × P(C) = 0,36 ✓ independent because P(B and C) = P(B) × 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

QUESTION/*VRAAG* 10

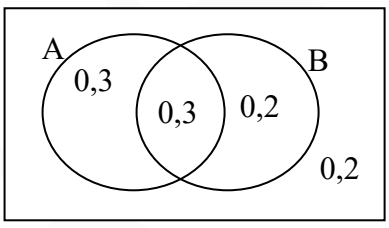
10.1.1	7! = 5 040	✓✓ answer (2)
10.1.2	4! × 4! = 576 P(African flags together) = $\frac{576}{5040}$ $\left(=\frac{4}{35}=0,11\right)$	✓ 4! ✓ 4! × 4! ✓ answer (A) (3)
10.2	P(A or B) = P(A) + P(B) – P(A and B) 0,88 = 0,4 + P(B) – P(A and B) 0,88 = 0,4 + P(B) – 0,4P(B) 0,48 = 0,6P(B) P(B) = 0,8	✓subs into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

TOTAL/*TOTAAL*: 150

QUESTION/VRAAG 11

11	Time $= \frac{20}{x}$ Cost = (water cost per hour × time) + (kms × R/km) $C(x) = 1{,}6 \times \left(\frac{20}{x}\right) + 20\left(1{,}2 + \frac{x}{4000}\right)$ $C(x) = \frac{32}{x} + 24 + \frac{x}{200}$ $C'(x) = -\frac{32}{x^2} + \frac{1}{200} = 0$ $x^2 = 6\,400$ $x = 80\,km/h$	✓ $\frac{20}{x}$ ✓ $1{,}6 \times \left(\frac{20}{x}\right)$ ✓ $20\left(1{,}2 + \frac{x}{4000}\right)$ ✓ $C(x) = \frac{32}{x} + 24 + \frac{x}{200}$ ✓ $C'(x) = -\frac{32}{x^2} + \frac{1}{200}$ ✓ $C'(x) = 0$ ✓ answer (A) (7)
		[7]

QUESTION/VRAAG 12

12.1.1	No, because P(A and B) $\neq 0$	✓ answer and reason (1)
12.1.2(a)	$P(\text{A and B}) = 0{,}3 \qquad P(\text{only B}) = 0{,}2$ $P(\text{A and B}) = P(\text{A}) \times P(\text{B})$ $0{,}3 = P(\text{A}) \times 0{,}5$ $P(\text{A}) = 0{,}6$ $P(\text{only A}) = 0{,}3$	✓ $P(\text{A and B}) = P(\text{A}) \times P(\text{B})$ ✓ 0,5 ✓ $P(\text{A}) = 0{,}6$ ✓answer (4)
12.1.2(b)	 $P(\text{not A or not B}) = 0{,}2 + 0{,}2 + 0{,}3 = 0{,}7$ **OR/OF** $P(\text{not A or not B}) = 1 - P(\text{A and B}) = 1 - 0{,}3 = 0{,}7$ **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)

<table>
<tr><td>12.2.1</td><td>P(novel) = $\frac{3}{12} = \frac{1}{4}$</td><td>✓answer
(1)</td></tr>
<tr><td>12.2.2</td><td>12! = 479 001 600</td><td>✓✓ answer
(2)</td></tr>
<tr><td>12.2.3</td><td>
<table>
<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(start with poetry, end with drama AND all novels together)
$= \frac{5 \times 3! \times 8! \times 4}{12!}$
$= \frac{1}{99}$
</td><td>✓ 5 × 4
✓ 3! = 6
✓8!

✓ $\frac{5 \times 3! \times 8! \times 4}{12!} = \frac{1}{99}$ (A)
(4)</td></tr>
<tr><td></td><td></td><td>[14]</td></tr>
</table>

TOTAL/TOTAAL: 150

10.2.2	Area of shaded region $=\frac{(\pi-2)}{4}\left(x^4-2x^3+x^2\right)$ $\frac{dA}{dx}=\left(\frac{\pi-2}{4}\right)\left(4x^3-6x^2+2x\right)$ $4x^3-6x^2+2x=0$ $x(2x^2-3x+1)=0$ $x(2x-1)(x-1)=0$ $x\neq 0$ or $x=\frac{1}{2}$ or $x\neq 1$	✓ $\left(\frac{\pi-2}{4}\right)\left(4x^3-6x^2+2x\right)$ ✓ factors ✓ $x=0;x=1;x=\frac{1}{2}$ ✓ $x=\frac{1}{2}$ (4)
		[13]

QUESTION/*VRAAG* 11

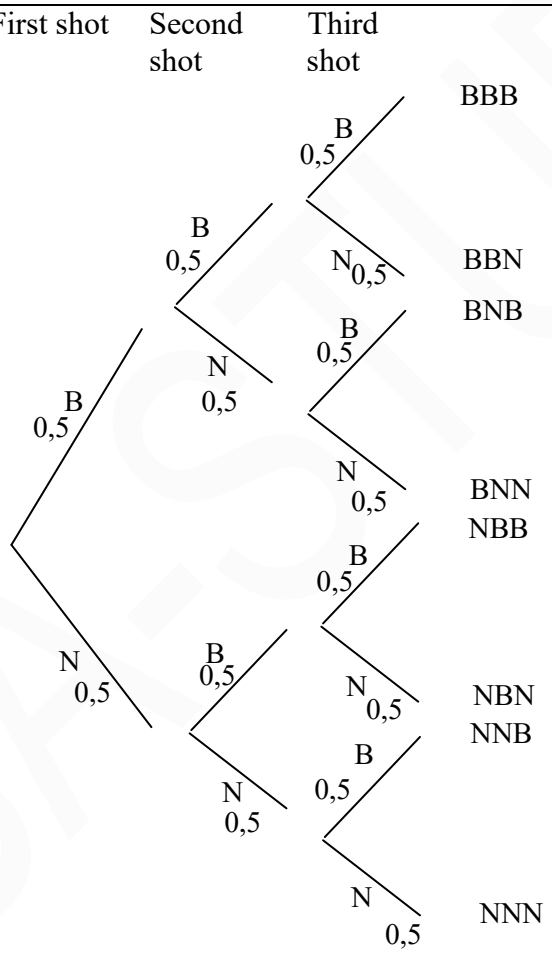
11.1	P(A) = 1 – P(not A) = 0,6 P(A and B) = P(A) × P(B) = 0,6 × 0,3 $=\frac{9}{50}$ = 0,18	✓ 0,6 ✓ P(A and B) = P(A) × P(B) ✓ answer (A) (3)
11.2.1	$a=\frac{15}{150}=0,1$	✓ $\frac{15}{150}$ (A) (1)
11.2.2	$m=1-0,7=0,3$	✓ 0,3 (A) (1)
11.2.3	$0,24+0,14+0,02+0,12+0,1+2b=0,7$ $2b=0,08$ $b=0,04$ $0,04\times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

TOTAL/*TOTAAL*: 150

QUESTION/*VRAAG* 10

10.1	10^{10} or 10 000 000 000	✓✓ answer (2)
10.2.1	$\underline{8} \times \underline{10} \times \underline{10}$ × $\underline{8} \times \underline{8} \times \underline{10}$ × $\underline{2} \times \underline{10} \times \underline{10} \times \underline{10}$ Area exchange number No. of valid 10-digit numbers $= (8 \times 10 \times 10) \times (8 \times 8 \times 10) \times (2 \times 10 \times 10 \times 10)$ $= 1{,}024 \times 10^9$	✓ $\underline{8} \times \underline{10} \times \underline{10}$ or $\underline{8} \times \underline{8} \times \underline{10}$ ✓ $\underline{2} \times \underline{10} \times \underline{10} \times \underline{10}$ ✓ $1{,}024 \times 10^9$ (A) (3)
10.2.2	Probability $= \frac{1{,}024 \times 10^9}{10^{10}}$ $= \frac{64}{625} = 0{,}1024 = 10{,}24\%$	✓ $\frac{1{,}024 \times 10^9}{10^{10}}$ ✓ answer (2)
		[7]

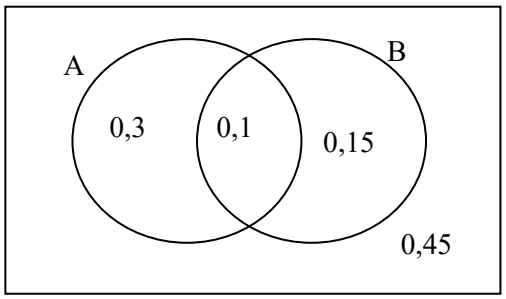
QUESTION/*VRAAG* 11

11		
11.1	P (Bull's eye first shot and second shot) $= 0{,}5 \times 0{,}5$ $= 0{,}25$ or $\frac{1}{4}$	✓two 0,5's ✓ $0{,}5 \times 0{,}5$ (2)

11.2	P (Bull's eye at least twice in 3 shots) $= (0,5 \times 0,5 \times 0,5) + (0,5 \times 0,5\times 0,5) + (0,5 \times 0,5\times 0,5) + (0,5 \times 0,5\times 0,5)$ $= 0,125 + 0,125 + 0,125 + 0,125$ $= 0,5$ or $\frac{1}{2}$	✓ $0,5 \times 0,5\times 0,5$ ✓four events ✓ answer (A) (3)
11.3	Person shoots first: $(0,5) + (0,5)^3 + (0,5)^5 + ...$ $P = \frac{a}{1-r}$ $P = \frac{0,5}{1-0,25}$ $P = \frac{2}{3} = 0,67$	✓ $(0,5) + (0,5)^3$ ✓ ... + $(0,5)^5 + ...$ ✓ $P = \frac{0,5}{1-0,25}$ (3)
		[8]

TOTAL/*TOTAAL*: 150

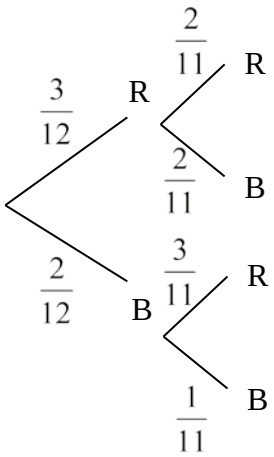
QUESTION/*VRAAG* 11

11.1.1	$P(A)\times P(B)$ independent events $= 0{,}40\times 0{,}25 = 0{,}1$  	✓0,1 ✓0,15 and 0,3 ✓0,45 (3)
11.1.2	$P(\text{A or not B}) = P(\text{A}) + P(\text{not B}) - P(\text{A and not B})$ $= 0{,}4 + 0{,}75 - 0{,}3$ $= 0{,}85$ **OR/OF** $P(\text{A or not B}) = 1 - P(\text{only B})$ $= 1 - 0{,}15$ $= 0{,}85$ **OR/OF** From Venn diagram: 0,3 + 0,1 + 0,45 = 0,85	✓ substitution ✓answer (2) **OR/OF** ✓ 1 – 0,15 ✓answer (2) **OR/OF** ✓ substitution ✓ answer (2)
11.2	$(5 \times 1 \times 5) + (5 \times 1 \times 6) + (5 \times 1 \times 6) + (5 \times 1 \times 5) = 110$ $110 \times 5 = 550 > 500$ Not possible, because not enough space **OR/OF** $(5 \times 2 \times 5) + (5 \times 2 \times 6) = 110$ $110 \times 5 = 550 > 500$ Not possible because not enough space **OR/OF**	✓5 × 1 × 5 ✓5 × 1 × 6 ✓5 × 1 × 6 ✓5 × 1 × 5 ✓110 ✓ conclusion (6) **OR/OF** ✓✓5 × 2 × 5 ✓✓5 × 2 × 6 ✓ 110 ✓ conclusion (6) **OR/OF**

	$5\times4\times6=120$ $5\times2=10$ $\therefore 120-10=110$ $110 \times 5 = 550 > 500$ Not possible because not enough space	✓✓ $5\times4\times6=120$ ✓ $5\times2=10$ ✓ $120-10$ ✓ 110 ✓ conclusion (6)
		[11]

TOTAL/*TOTAAL:* 150

QUESTION/*VRAAG* 10

10.1	 P(One Red and One Blue) = P(Red, Blue) + P(Blue, Red) $=\left(\frac{3}{12}\right)\times\left(\frac{2}{11}\right)+\left(\frac{2}{12}\right)\times\left(\frac{3}{11}\right)$ $=\frac{1}{11}$	✓ $\left(\frac{3}{12}\right)\times\left(\frac{2}{11}\right)$ ✓ $\left(\frac{2}{12}\right)\times\left(\frac{3}{11}\right)$ ✓ addition of products ✓ answer (4)
10.2.1	$a = 0{,}48\times 250$ $a = 120$	✓ answer (1)
10.2.2	b = 150 P(S) × P(F) $=\frac{200}{250}\times\frac{150}{250}$ = 0,48 = P(S and F) These events are independent / *Hierdie gebeurtenisse is onafhanklik*	✓ b ✓ P(S) × P(F) ✓ $\frac{200}{250}$ and $\frac{150}{250}$ ✓ conclusion (with realistic probabilities) (4)
		[9]

QUESTION/*VRAAG* 11

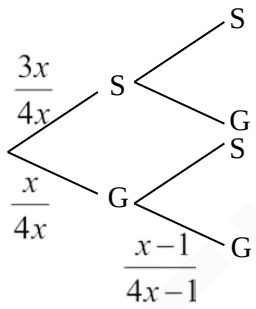
11.1	10 × 9 = 90	✓✓ 10 × 9 (2)
11.2.1	10! =3 628 800	✓ 10! (1)
11.2.2	2! × 2! × 2! × 2! × 2! ×4! = 768	✓ 2! × 2! × 2! × 2! × 2! ✓ 4! ✓ 2! × 2! × 2! × 2! × 2!×4! or 768 (3) **[6]**

TOTAL/*TOTAAL*: 150

QUESTION/*VRAAG* 11

11.1.1	$7^5 = 16\,807$	✓✓ answer (2)
11.1.2	$7\times6\times5\times4\times3$ $= \frac{7!}{2!} = 2520$	✓ $7\times6\times5\times4\times3$ or $\frac{7!}{2!}$ ✓answer (2)
11.2	$2\times7\times1 = 14$	✓✓✓ $2\times7\times1$ (3)
		[7]

QUESTION/*VRAAG* 12

12.1	P(A or B) = P(A) + P(B) 0,74 = 0,45 + *y* *y* = 0,29	✓ P(A or B) = P(A) + P(B) ✓substitution ✓answer (3)
12.2	 Let the number of mystery gift bags = *x* The total number of bags = 4*x* $\left(\frac{x}{4x}\right)\times\left(\frac{x-1}{4x-1}\right) = \frac{7}{118}$ $\frac{1}{4}\times\frac{x-1}{4x-1} = \frac{7}{118}$ $\frac{x-1}{4x-1} = \frac{28}{118}$ $118x - 118 = 112x - 28$ $x = 15$	✓ 4*x* ✓$\left(\frac{x}{4x}\right)$ or $\left(\frac{1}{4}\right)$ ✓$\left(\frac{x-1}{4x-1}\right)$ ✓$\frac{1}{4}\times\frac{x-1}{4x-1}$ ✓ equating to $\frac{7}{118}$ ✓answer (6)

	OR/OF P(gift and gift) = P(gift at first draw) × P(gift at second draw) $\frac{7}{118} = \frac{1}{4} \times$ P(gift at second draw) P(gift at second draw) = $\frac{7}{118} \div \frac{1}{4}$ $= \frac{14}{59}$ Therefore: P(gift at first draw) $= \frac{15}{60}$ And: 15 bags had mystery gifts inside	**OR/OF** ✓$\frac{1}{4}$ ✓$\frac{1}{4} \times$ P(gift at 2nd draw) ✓ $\frac{7}{118} = \frac{1}{4} \times$ P(gift at 2nd draw) ✓$\frac{14}{59}$ ✓ $\frac{15}{60}$ ✓answer (6)
		[9]

TOTAL/*TOTAAL*: 150

QUESTION/*VRAAG* 11

11.1.1	Let the event Veli arrive late for school be V. Let the event Bongi arrive late for school be B. / *Laat V die gebeurtenis wees dat Veli Laat B die gebeurtenis wees dat Bongi laatkom* $P(V \text{ or } B) = 1 - 0,7$ $= 0,3$	✓ answer (1)
11.1.2	$P(V \text{ or } B) = P(V) + P(B) - P(V \text{ and } B)$ $0,3 = 0,25 + P(B) - 0,15$ $P(B) = 0,2$	✓ $P(V \text{ or } B) = P(V) + P(B) - P(V \text{ and } B)$ ✓substitution ✓ 0,2 (3)
11.1.3	$P(V) \times P(B) = 0,25 \times 0,2$ $= 0,05$ $P(V) \times P(B) \neq P(V \text{ and } B)$ V and B are NOT independent/ *V en B is NIE onafhanklik nie.*	✓ $P(V) \times P(B) = 0,05$ ✓ $P(V) \times P(B) \neq P(V \text{ and } B)$ ✓NOT independent (3)
11.2.1	$6! = 720$	✓ 6! or 720 (2)
11.2.2	Number of arrangements $= 3! \times 3! \times 2$ $= 72$	✓ $3! \times 3!$ ✓ $\times 2$ ✓ answer (3)
11.2.3	$P(\text{hearts next to each other}) = \frac{3! \times 4!}{6!}$ $= \frac{144}{720}$ $= \frac{1}{5}$ or 0,2 or 20% **OR/*OF*** $P(\text{hearts next to each other}) = \frac{4 \times 3! \times 3!}{6!}$ $= \frac{144}{720}$ $= \frac{1}{5}$ or 0,2 or 20%	✓ ✓ $3! \times 4!$ ✓ $\frac{1}{5}$ or 0,2 or 20% **OR/*OF*** ✓ ✓ ✓ $\frac{1}{5}$ or 0,2 or 20% (3) **[15]**

TOTAL/*TOTAAL*: 150

QUESTION/*VRAAG* 10

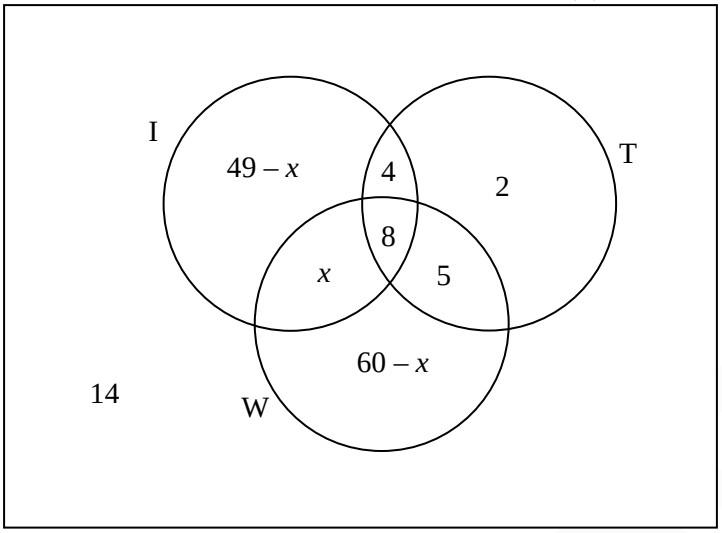
10.1	$10!$ $=3\,628\,800$	✓10! ✓ answer (2)
10.2	$4! \times 7!$ $= 120\,960$ **OR/OF** $4! \times 6! \times 7$ $= 120\,960$	✓ 4! ✓ 7! ✓ $4! \times 7!$ or 120 960 (3) OR/OF ✓ 4! ✓ $6! \times 7$ ✓ $4! \times 6! \times 7$ or 120 960 (3)
10.3	$\frac{6!}{10!}$ $= \frac{1}{5040}$ or 0,000198	✓ 6! ✓ $\frac{6!}{10!}$ or $\frac{1}{5040}$ or 0,000198 (2) **[7]**

QUESTION/*VRAAG* 11

11.1	$P(\text{tennis}) \times P(\leq 35 \text{ years}) = P(\text{tennis and} \leq 35 \text{ years})$ $\frac{21}{140} \times \frac{80}{140} = \frac{a}{140}$ $a = 12$	✓ statement ✓ substitution ✓ answer (3)
11.2	$P(\text{gym or} \leq 35 \text{ years})$ $= P(\text{gym}) + P(\leq 35 \text{ years}) - P(\text{gym and} \leq 35 \text{ years})$ $= \frac{70}{140} + \frac{80}{140} - \frac{40}{140}$ $= \frac{110}{140}$ $= \frac{11}{14}$ or 0,79	✓ statement ✓ $\frac{70}{140}$ ✓ $\frac{80}{140}$ ✓ $\frac{40}{140}$ ✓ $\frac{110}{140}$ or $\frac{11}{14}$ or 0,79 (5) **[8]**

TOTAL/*TOTAAL*: 150

QUESTION/*VRAAG* 10

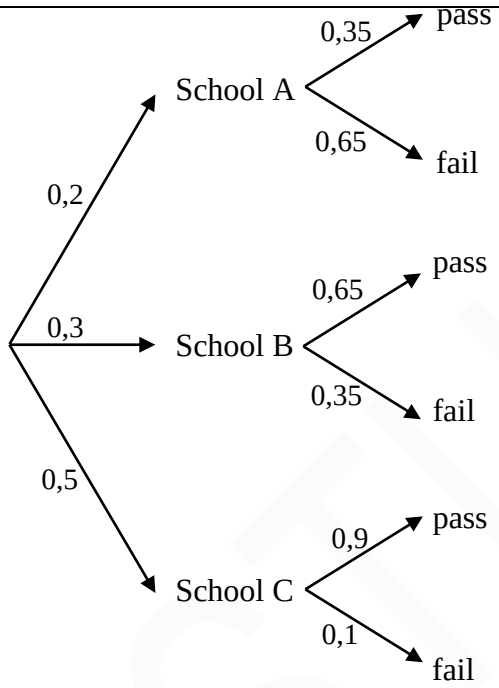
10.1	n(S) = 100  	8 values need to be placed in correct position: 2 or 3 correct: 1 mark 4 or 5 correct: 2 marks 6 or 7 correct: 3 marks 8 correct: 4 marks (4)
10.2	$(49-x)+x+8+4+5+2+(60-x)+14=100$ $-x+142=100$ $x=42$	✓ setting up equation ✓ answer (2)
10.3	P (use only one application) $=\frac{7+2+18}{100}$ $=\frac{27}{100}$ or 27%	✓ $\frac{7+2+18}{100}$ ✓answer (2) **[8]**

QUESTION/*VRAAG* 11

11.1	5 x 5 x 10 x 9 = 2250	✓ 5 x 5 ✓ 10 x 9 ✓ 2250 (3)
11.2	<table><tr><th>No of digits used</th><th>Letters</th><th>Digits</th><th>Total</th></tr><tr><td>1</td><td>5 x 5</td><td>10</td><td>250</td></tr><tr><td>2</td><td>5 x 5</td><td>10 x 9</td><td>2 250</td></tr><tr><td>3</td><td>5 x 5</td><td>10 x 9 x 8</td><td>18 000</td></tr><tr><td>4</td><td>5 x 5</td><td>10 x 9 x 8 x7</td><td>126 000</td></tr><tr><td>5</td><td>5 x 5</td><td>10 x 9 x 8 x7 x 6</td><td>756 000</td></tr></table> Codes of two letters and five digits will ensure unique numbers for 700 000 clients.	✓ 5 x 5 x 10 x 9 x 8 x 7 x 6 ✓✓ five digits (3) **[6]**

TOTAL/*TOTAAL*: 150

QUESTION/*VRAAG* 11

11.1	$8\times7\times6\times5\times4$ or $\frac{8!}{3!}$ $=6720$	✓$8\times7\times6\times5\times4$ / $\frac{8!}{3!}$ ✓6720 (2)
11.2	$P(A \text{ and } B)=P(A)\times P(B)$ $=0,4\times0,35$ $=0,14$ $P(A \text{ or } B)=P(A)+P(B)-P(A \text{ and } B)$ $=0,4+0,35-0,14$ $=0,61$	✓ $0,4\times0,35$ ✓ 0,14 ✓ substitution ✓ answer (4)
		
11.3.1	$100\%-20\%$ or/of $1-0,2$ $=80\%$ $=0,8$ **OR/*OF*** 30% + 50% = 80% or/of 0,3 + 0,5 = 0,8	✓$100\%-20\%$ or $1-0,2$ ✓80% or 0,8 ✓30% + 50% or 0,3 + 0,5 ✓ 80% or 0,8 (2)
11.3.2	$0,3\times0,35=0,105$ $=10,5\%$	✓ 0,3 ✓ 0,35 ✓ $0,105=10,5\%$ (3)
11.3.3	$(0,2\times0,35)+(0,3\times0,65)+(0,5\times0,9)$ $=0,715$ $=71,5\%$	✓$0,2\times0,35$ ✓$0,3\times0,65$ ✓$0,5\times0,9$ ✓answer (4) **[15]**

TOTAL/*TOTAAL*: 150

QUESTION/*VRAAG 8*

Penalise candidates a maximum of one mark (overall) for notation error in 8.1 and 8.2

8.1	$f'(x)=\lim_{h\to 0}\frac{f(x+h)-f(x)}{h}$ Notation formula Formula can be implied
8.2	• If function and derivative is mixed but splitting of fractions is evident max ¾ • If they start with differentiation – breakdown 0/4
8.3	$y''=0$ can be implied

QUESTION/*VRAAG 9*

9.2	No working is shown(calculator used) • If the cubic becomes a quadratic 2/5 • If three brackets 5/5
9.3	$f'(x)=0$ cannot be implied $f'(x)=3x^2-2x-1$ $x=-\left(\frac{-2}{2(3)}\right)$ **BE CAREFUL** 1/6 for derivative $=\frac{1}{3}$
9.4	If dots only indicated on the graph 1/3 – x and y-intercepts
9.5	Only CA from a cubic graph Each answer gets evaluated independently

QUESTION/*VRAAG 10*

10.2	Derivative equal to zero is an independent mark $A'(r)=0$ can be implied if working is correct

QUESTION/*VRAAG 11*

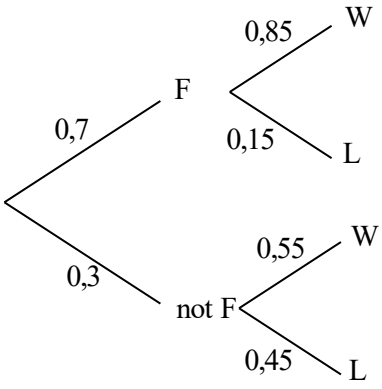
If percentages are used – penalize once per question

11.1	Answer only 2/2 2 or 0 marks
11.3.2	Do not penalize rounding
11.3.3	Do not penalize rounding

QUESTION/*VRAAG* 10

10.1.1	$P(S \text{ and } T) = P(S) \times P(T)$ $\frac{1}{6} = \left(\frac{1}{4}\right) \times P(T)$ $P(T) = \frac{2}{3}$	✓ $P(S \text{ and } T) = P(S) \times P(T)$ ✓ $P(T) = \frac{2}{3}$ (2)
10.1.2	$P(S \text{ or } T) = P(S) + P(T) - P(S \text{ and } T)$ $= \left(\frac{1}{4}\right) + \left(\frac{2}{3}\right) - \frac{1}{6}$ $= \frac{3}{4}$	✓ $\left(\frac{1}{4}\right) + \left(\frac{2}{3}\right) - \frac{1}{6}$ ✓ $\frac{3}{4}$ (2)
10.2.1	$5!$ $= 120$	✓ 5 ✓ 5! or 120 (2)
10.2.2	5^5 $= 3125$	✓ 5^5 or 3 125 (1)
10.3	$n(E) = 5! \times 2! \times 2!$ $n(S) = 7!$ $P(E) = \frac{5! \times 2! \times 2!}{7!}$ $= \frac{2}{21}$	✓ 5! ✓ $2! \times 2!$ ✓ $\frac{5! \times 2! \times 2!}{7!}$ ✓ $\frac{2}{21}$ (4)
		[11]

QUESTION/*VRAAG* 11

11	 P(F and W) = 0,595 P(F and L) = 0,105 P(not F and W) = 0,165 P(not F and L) = 0135 P(Win) = P(F and W) + P(not F and W) = 0,7 × 0,85 + 0,3 × 0,45 = 0,595 + 0,165 = 0,76 = 76% $= \frac{19}{25}$	✓ 0,3 ✓ P(F and W) = 0,7 × 0,85 = 0,595 ✓ P(not F and W) = 0,3 × 0,45 = 0,165 ✓ 0,595 + 0,165 ✓ 0,76 / 76% / $\frac{19}{25}$ (5)
		[5]

TOTAL/*TOTAAL*: 150

QUESTION/*VRAAG* 11

11.1

	Watches TV during exams	Do not watch TV during exams	Total
Male	80	a	$80+a$
Female	48	12	60
Total	b	32	160

$a+12=32$

$a=20$

$b=80+48$

$=128$

✓a = 20

✓b = 128 (2)

11.2

No

$P(\text{M and not watching TV})=\frac{20}{160}\neq 0$

✓No

✓reason (2)

11.3.1

$P(\text{watching TV})=\frac{128}{160}=\frac{4}{5}=0,8=80\%$

✓128
✓160 (2)

11.3.2

$P(\text{female and not watching TV})=\frac{12}{160}=\frac{3}{40}=0,075=7,5\%$

✓ 12
✓160 (2)
[8]

QUESTION/*VRAAG* 12

12.	We want to create codes that are even numbers greater than 5000. The digit 6 can be used in one of two places in these codes and therefore this presents two scenarios. *Ons wil kodes kry wat ewe getalle groter as* 5000 *is. Die syfer* 6 *kan in twee posisies in die kode gebruik word en twee opsies is moontlik:* CASE 1: The first digit is a 6./*Die eerste syfer is'n* 6. **6** **2** **4** 1 × 5 × 4 × 2 Number of codes starting with 6./*Getal kodes wat met* 6 *begin.* = 1 × 5 × 4 ×2 = 40 CASE 2: The first digit is a 5 or 7./*Die eerste syfer is'n* 5 *of* 7. **5** **2** **4** **7** **6** 2 × 5 × 4 × 3 Number of codes not starting with 6./*Getal kodes wat nie met* 6 *begin* = 2 × 5 × 4 ×3 = 120 Therefore total number of possible codes./*Die totale getal moontlike kodes* = 40 + 120 = 160. **OR/OF** $(3\times5\times4\times1)+(3\times5\times4\times1)+(2\times5\times4\times1)$ = 60 + 60 + 40 = 160 **OR/OF** $(3\times5\times4\times3)-(1\times5\times4\times1)$ = 180 – 20 = 160	✓ 1 × 5 × 4 ×2 ✓ 40 ✓ 2 × 5 × 4 ×3 ✓ 120 ✓ 160 **[5]** ✓ $(3\times5\times4\times1)$ ✓ $(3\times5\times4\times1)$ ✓ $(2\times5\times4\times1)$ ✓✓ 160 **[5]** ✓✓ $(3\times5\times4\times3)$ ✓✓ $(1\times5\times4\times1)$ ✓ 160 **[5]**

TOTAL/*TOTAAL*: 150

QUESTION/*VRAAG 10*

10.1.1 (a)	$\text{P(Female/Vroulik)} = \frac{70}{150} = \frac{7}{15} = 0,47$	✓ 70 ✓ answer (2)
10.1.1 (b)	$\text{P(Female playing tennis/Vroulik speel tennis)} = \frac{20}{150} = \frac{2}{15} = 0,13$	✓ answer (1)

10.1.2	$\text{P(Female/Vroulik)} = \frac{70}{150}$ $\text{P(Playing/Speel tennis)} = \frac{70}{150}$ $\text{P(Female playing tennis/Vrouliks speel tennis)} = \frac{20}{150} = 0,13$ $\text{P(Female/Vroulik)} \times \text{P(Playing/Speel tennis)} = \left(\frac{70}{150}\right)\left(\frac{70}{150}\right) = \frac{4900}{22500} = 0,22$ P(Female playing tennis/Vroulik speel tennis) $\neq$ P(Female/Vroulik) × P(Playing/Speel tennis) Therefore the event of playing tennis is not independent of gender./ Dus is die gebeurtenis om tennis te speel nie onafhanklik van geslag nie **OR/OF** $\text{P(Male/Manlik)} = \frac{80}{150}$ $\text{P(Playing/Speel tennis)} = \frac{70}{150}$ $\text{P(Male playing tennis/Manlik speel tennis)} = \frac{50}{150} = 0,33333$ $\text{P(Male/Manlik)} \times \text{P(Playing/Speel tennis)} = \left(\frac{80}{150}\right)\left(\frac{70}{150}\right) = \frac{5600}{22500} = 0,25$ P(Male playing tennis/Manlik speel tennis) $\neq$ P(Male/Manlik) × P(Playing/Speel tennis) Therefore the event of playing tennis is not independent of gender./ Dus is die gebeurtenis om tennis te speel nie onafhanklik van geslag nie. **OR/OF**	✓ $\text{P(Play ten)} = \frac{70}{150}$ ✓ $\left(\frac{70}{150}\right)\left(\frac{70}{150}\right) = \frac{4900}{22500} = 0,22$ ✓ P(F play t) ≠ P(F) × P(Play t) Not independent (3) ✓ $\text{P(Play ten)} = \frac{70}{150}$ ✓ $\left(\frac{80}{150}\right)\left(\frac{70}{150}\right) = \frac{5600}{22500} = 0,25$ ✓ P(M play t) ≠ P(M) × P(Play t) Not independent (3)

	$P(\text{Male}) = \frac{80}{150}$ $P(\text{Not playing tennis}) = \frac{80}{150}$ $P(\text{Male not playing tennis}) = \frac{80}{150} = 0,53333$ $P(\text{Male}) \times P(\text{Not playing tennis}) = \left(\frac{80}{150}\right)\left(\frac{80}{150}\right) = \frac{6400}{22500} = 0,28$ $P(\text{Male not playing tennis}) \neq P(\text{Male}) \times P(\text{Not playing tennis})$ Therefore the event of playing tennis in not independent of gender. **OR/OF** $P(\text{Female}) = \frac{70}{150}$ $P(\text{Not playing tennis}) = \frac{80}{150}$ $P(\text{Female not playing tennis}) = \frac{50}{150} = 0,3333$ $P(\text{Female}) \times P(\text{Not playing tennis}) = \left(\frac{70}{150}\right)\left(\frac{80}{150}\right) = \frac{5600}{22500} = 0,25$ $P(\text{Female not playing tennis}) \neq P(\text{Female}) \times P(\text{Not playing tennis})$ Therefore the events of playing tennis and gender are not independent.	✓ $P(\text{not play ten}) = \frac{80}{150}$ ✓ $\left(\frac{80}{150}\right)\left(\frac{80}{150}\right) = \frac{6400}{22500} = 0,28$ ✓ $P(\text{M not play t}) \neq P(\text{M}) \times P(\text{Not play t})$ Not independent (3) ✓ $P(\text{not play ten}) = \frac{80}{150}$ ✓ $\left(\frac{70}{150}\right)\left(\frac{80}{150}\right) = \frac{5600}{22500} = 0,25$ ✓ $P(\text{F not play t}) \neq P(\text{F}) \times P(\text{Not play t})$ Not independent (3)
10.2	$P(B) = 1 - P(B')$ $= 1 - 0,28$ $= 0,72$ $P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$ $0,96 = 0,24 + 0,72 - P(A \text{ and } B)$ $0,96 = 0,96 - P(A \text{ and } B)$ $P(A \text{ and } B) = 0$ Events A and B are mutually exclusive *Gebeurtenis A en B is onderling uitsluitend*	✓ $P(B) = 0,72$ ✓ $P(A) = 0,24$ ✓ substitution into correct formula ✓ $P(A \text{ and } B) = 0$ (4) **[10]**

QUESTION/*VRAAG 11*

11.1	2 x 2! x 7! = 20 160	✓ 2 x 2! ✓ 7! ✓ 20 160 (3)
11.2	All seated in 9! = 362 880 ways Girls seated together in 4! ways. With the girls as one unit they can all be seated in 4! 6! ways = 17280 *Almal sit op 9! = 362 880 maniere* *Meisies sit saam op 4! maniere.* *Met die meisies as 'n eenheid kan almal op* *4! 6!maniere = 17280 sit* P(all girls seated together/al die meisies sit saam) $= \frac{4!\,6!}{9!}$ $= \frac{17280}{362880}$ $= \frac{1}{21}$ $= 0{,}047619....$ $= 4{,}76\%$	✓ 9! or 362 880 ✓ 4! 6! or 17280 ✓ $\frac{17280}{362880}$ or $\frac{1}{21}$ or 0,047619 or 4,76% (3) **[6]**
	TOTAL/*TOTAAL:*	**150**

QUESTION/*VRAAG* 9

9.1	$340 = \pi r^2 h$ $\therefore h = \frac{340}{\pi r^2}$	✓substitution into volume formula ✓answer (2)
9.2	$A = 2\pi r^2 + 2\pi rh$ $= 2\pi r^2 + 2\pi r\left(\frac{340}{\pi r^2}\right)$ $= 2\pi r^2 + 680r^{-1}$	✓formula ✓substitution of h (2)
9.3	$A(r) = 2\pi r^2 + 680r^{-1}$ $A'(r) = 4\pi r - 680r^{-2}$ $4\pi r - 680r^{-2} = 0$ $4\pi r = \frac{680}{r^2}$ $r^3 = \frac{680}{4\pi}$ $r = \sqrt[3]{\frac{680}{4\pi}}$ cm or $3{,}78$ cm	✓ $4\pi r$ ✓ $-680r^{-2}$ ✓ $r^3 = \frac{680}{4\pi}$ ✓answer (4) **[8]**

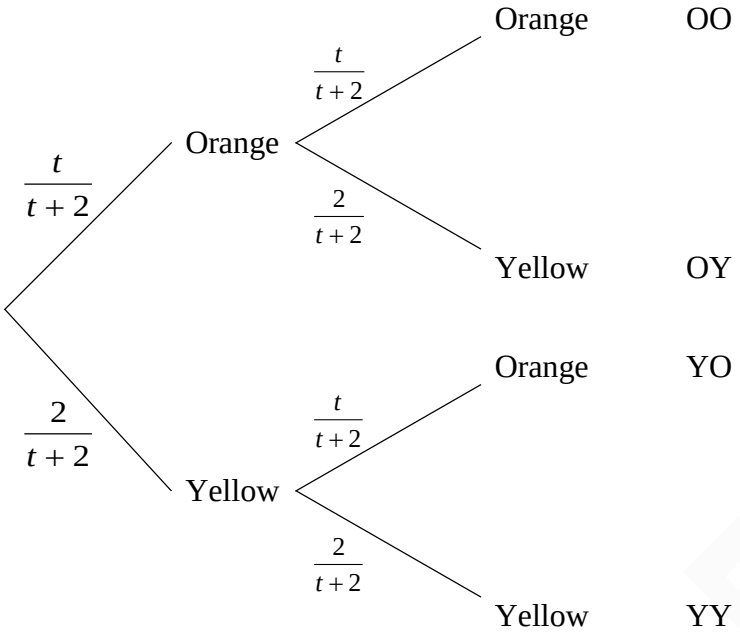
QUESTION/*VRAAG* 10

10.1.1	160	✓answer (1)
10.1.2	$P(M) = \frac{60}{160}$ $= \frac{3}{8}$ $= 0{,}375$	✓60 ✓answer (2)
10.1.3	$P(Male) \times P(Coffee) = P(Male\ and\ Coffee)$ $P(Manlik) \times P(Koffie) = P(Manlik\ en\ Koffie)$ $\frac{3}{8} \times \frac{80}{160} = \frac{b}{160}$ $\frac{3}{16} = \frac{b}{160}$ $16b = 480$ $b = 30$	✓formula ✓ $\frac{80}{160}$ ✓ $\frac{b}{160}$ ✓ answer (4)

10.2.1	$6!$ $= 6\times5\times4\times3\times2\times1$ $= 720$	✓6! ✓answer (2)
10.2.2	number of ways Xoliswa sits next to Anees/ *getal maniere waarop Xoliswa langs Anees sit* $= 5!\times 2$ $= 240$ **OR/*OF*** Regard Xoliswa and Anees as a single entity/*Beskou Xoliswa en Anees as een* Number of ways in which 5 passengers can be arranged = 5! *Getal maniere waarop 5 passasiers gerangskik kan word* = 5! So 5! different arrangements for XA and 5! different arrangements for AX *So 5! verskillende rangskikkings vir XA en 5! verskillende rangskikkings vir AX* number of ways Xoliswa sits next to Anees *getal maniere waarop Xoliswa langs Anees sit* $= 5!\times 2$ $= 240$	✓$5!\times 2$ ✓answer (2) ✓$5!+5!$ ✓answer (2)
10.2.3	number of ways Mary is at an end of the row on the left $= 1\times5!$ number of ways Mary is at an end of the row on the right $= 5!\times1$ total number of arrangements $= 6!$ $P(\text{Mary is at an end of the row}) = \frac{5!\times1+1\times5!}{6!}$ $= \frac{1}{3}$ *getal maniere waarop Mary aan die einde van die ry links is* $= 1\times5!$ *getal maniere waarop Mary aan die einde van die ry regs is* $= 5!\times1$ *totale getal rangskikkings* $= 6!$ $P(\text{Mary is } \textit{aan einde van die ry}) = \frac{5!\times1+1\times5!}{6!}$ $= \frac{1}{3}$	✓both LHS and RHS ways ✓$6!$ ✓setting up probability ✓answer (4) **[15]**
	TOTAL/*TOTAAL*:	**150**

QUESTION/*VRAAG* 11

11.1	P(A) $\times$ P(B) = $0,2 \times 0,63$ = 0,126 i.e. P(A) $\times$ P(B) = P(A and B) Therefore A and B are independent/*Dus is A en B onafhanklik*	✓$0,2 \times 0,63$ ✓P(A)$\times$P(B)=P(A and B) ✓conclusion (3)
11.2.1	$7^7 = 823\,543$	✓✓7^7 (2)
11.2.2	7!=5040	✓✓7! (2)
11.2.3	There are 3 vowels $\Rightarrow$3 options for first position There are 4 consonants $\Rightarrow$4 options for last position The remaining 5 letters can be arranged in $5 \times 4 \times 3 \times 2 \times 1$ ways $3 \times (5 \times 4 \times 3 \times 2 \times 1) \times 4 = 1440$ *Daar is 3 klinkers* $\Rightarrow$*3 opsies vir die eerste posisie* *Daar is 4 konsonante* $\Rightarrow$*4 opsies vir die laaste posisie* *Die oorblywende 5 letters kan as volg gerangskik word* $5 \times 4 \times 3 \times 2 \times 1$ ways/*maniere* $3 \times (5 \times 4 \times 3 \times 2 \times 1) \times 4 = 1440$	✓$\times$3 ✓$\times$4 ✓$5 \times 4 \times 3 \times 2 \times 1$ ✓answer (4)

11.3	 $\text{P(Orange, Orange)} + \text{P(Yellow, Yellow)} = \frac{52}{100}$ $\left(\frac{t}{t+2}\right)\left(\frac{t}{t+2}\right)+\left(\frac{2}{t+2}\right)\left(\frac{2}{t+2}\right)=\frac{52}{100}$ $\frac{t^2}{t^2+4t+4}+\frac{4}{t^2+4t+4}=\frac{13}{25}$ $25\left(t^2+4\right)=13\left(t^2+4t+4\right)$ $3t^2-13t+12=0$ $(3t-4)(t-3)=0$ $t=3$ There are 3 orange balls in the bag/*Daar is 3 oranje balle in die sak*	✓P(O) = $\left(\frac{t}{t+2}\right)$ ✓P(Y) = $\left(\frac{2}{t+2}\right)$ ✓P(O,O) = $\left(\frac{t}{t+2}\right)^2$ ✓ P(Y,Y) = $\left(\frac{2}{t+2}\right)^2$ ✓ $\left(\frac{t}{t+2}\right)\left(\frac{t}{t+2}\right)+\left(\frac{2}{t+2}\right)\left(\frac{2}{t+2}\right)=\frac{52}{100}$ ✓ $t=3$ (no ca) (6) **[17]**
	TOTAL/TOTAAL:	**150 marks**

QUESTION/*VRAAG* 10

10.1.1	$d = 5$ $e = 4$ $f = 7$ $g = 5$	✓$d = 5$ ✓$e = 4$ ✓$f = 7$ ✓$g = 5$ (4)
10.1.2a	P(A and/*en* B and/*en* C) = $\frac{4}{54} = \frac{2}{27}$	✓ $\frac{4}{54} = \frac{2}{27}$ (1)
10.1.2b	P(A or/*of* B or/*of* C) = $\frac{48}{54} = \frac{8}{9}$	✓ $\frac{48}{54} = \frac{8}{9}$ (1)
10.1.2c	P(only/*slegs* C) = $\frac{7}{54}$	✓ $\frac{7}{54}$ (1)
10.1.2d	P(that a country uses exactly two methods/*dat 'n land presies twee metodes gebruik*) = $\frac{5+4+8}{54} = \frac{17}{54}$	✓ $\frac{17}{54}$ (1)
10.2.1	P(selects *Midnight* as drama/*kies Midnight as drama*) = $\frac{1}{5}$	✓✓ answer/*antwoord* (2)
10.2.2	Number of different selections of drama, romance and comedy/*Aantal verskillende keuses van drama, liefdesverhale en komedie* = 5 × 4 × 3= 60	✓ product/*produk* ✓answer/*antwoord* (2)
10.2.3	P(select *Last Hero* and *Laughing Dragon*/*kies Last Hero en Laughing Dragon*) = $\frac{1}{5} \times \frac{1}{3} = \frac{1}{15}$ **OR/*OF*** P(select *Last Hero* and *Laughing Dragon*/*kies Last Hero en Laughing Dragon*) = $\frac{1 \times 4 \times 1}{60} = \frac{1}{15}$	✓ product/*produk* ✓answer/*antwoord* (2) ✓ product/*produk* ✓ answer/*antwoord* (2) **[14]**
	TOTAL/TOTAAL:	**150**

QUESTION/*VRAAG* 10

10.1	$l + 2h = 40$ $l = 40 - 2h$	✓answer (1)
10.2	$2b + 2h = 100$ $b = 50 - h$ $V = lbh$ $V = h(40 - 2h)(50 - h)$	✓ $2b + 2h = 100$ ✓ $b = 50 - h$ ✓volume formula (3)
10.3	$V = (50h - h^2)(40 - 2h)$ $V = 2h^3 - 140h^2 + 2000h$ $V' = 6h^2 - 280h + 2000 = 0$ $h = \frac{280 \pm \sqrt{(-280)^2 - 4(6)(2000)}}{2(6)}$ $h \neq 37{,}86$ or $h = 8{,}80$ $\therefore$ for a box as large as possible, $h = 8{,}80$ cm *vir die grootste moontlike boks = 8,80 cm*	✓simplifying/*vereenvoudig* ✓derivative / *afgeleide* ✓✓*h*-values in any form / *h-waardes in enige vorm* ✓answer/*antwoord* (5) **[9]**

QUESTION/*VRAAG* 11

11.1.1	P(male/*manlik*) = $\frac{83}{180}$ or 0,46 or 46,11%	✓answer/*antwoord* (1)
11.1.2	P(not game park/*nie wildreservaat*) = 1 – P(game park/*wildreservaat*) $= 1 - \frac{62}{180}$ $= \frac{59}{90}$ or 0,66 or 65,56% **OR/*OF*** P(not game park/*nie wildreservaat*) $= \frac{98}{180} + \frac{20}{180}$ $= \frac{118}{180}$ $= \frac{59}{90}$ or 0,66 or 65,56%	✓ $1 - \frac{62}{180}$ ✓answer/*antwoord* (2) ✓ $\frac{98}{180} + \frac{20}{180}$ ✓answer/*antwoord* (2)

11.2

Events are independent if /*Gebeure is onafhanklike indien*
P(male) × P(home) = P(male and home)
P(*manlik*) × P(*huis*) = P(*manlik en huis*)

P(male/*manlik*) = $\frac{83}{180}$

and/*en* P(home/*huis*) = $\frac{20}{180}$ or 0,11 or 11,11%

P(male/*manlik*) × P(home/*huis*)
= $\frac{83}{180} \times \frac{20}{180}$
= $\frac{83}{1620}$
= 0,05123 or 5,12%

P(male and home/*manlik en huis*)
= $\frac{13}{180}$
= 0,07222… or 7,22%

Therefore P(male) × P(home) ≠ P(male and home)
Dus P(*manlik*) × P(*huis*) ≠ P(*manlik en huis*)
Thus the events are not independent./*Dus is die gebeure nie onafhanklik nie*

OR/*OF*

	Home/*Huis*	Not Home/ *Nie huis*	
M	13	70	83
F	7	90	97
	20	160	180

P(female/*vroulik*) × P(not home/nie *huis*)
= $\frac{97}{180} \times \frac{160}{180}$
= $\frac{194}{405}$
= 0,479012345… or 47,90%

P(female and not home/*vroulik en nie-huis*)
= $\frac{90}{180}$
= 0,5 or 50%

Therefore P(female) × P(not home) ≠ P(female and not home)
Thus the events are not independent.
Dus P(*vroulik*) × P(nie-*huis*) ≠ P(*vroulik en nie-huis*)
Dus is die gebeure nie onafhanklik nie.

✓P(*m*) × P(*h*) and their values/*en hulle waardes*

✓answer of product

✓P(*m* and/*en h*) value/*waarde*

✓conclusion/*afleiding* (4)

✓P(*f*) × P(not *h*) and their values/*en hulle waardes*

✓answer of product

✓P(*f* and/*en* not *h*) value/*waarde*

✓conclusion/*afleiding* (4)

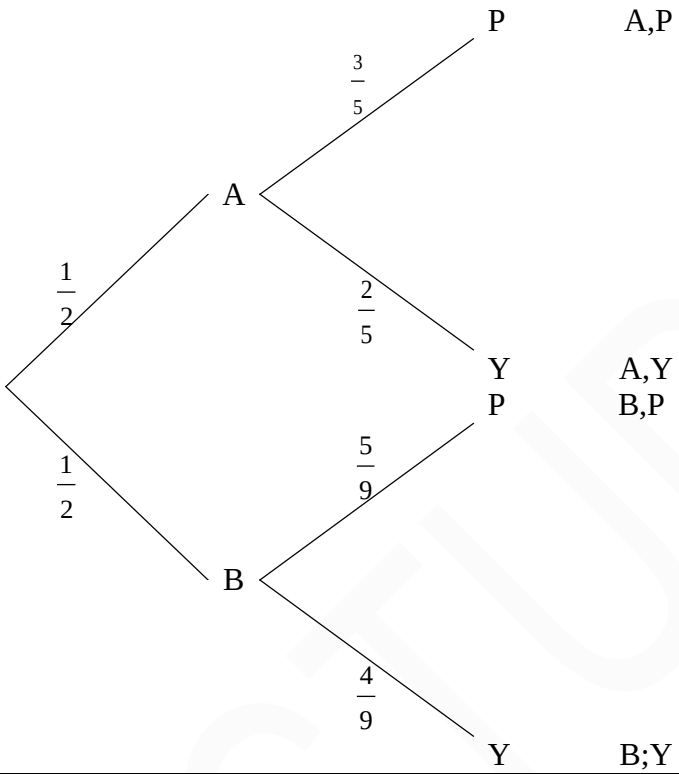
[7]

QUESTION/*VRAAG* 12

12.1.1	$26\times25\times24\times23\times22$ = 7 893 600 **OR/*OF*** $^{26}P_5 = \frac{26!}{(26-5)!} = \frac{26!}{21!} = 7\,893\,600$	✓ $26\times25\times24\times23\times22$ ✓7 893 600 (2) ✓formula/*formule* ✓answer/*antwoord* (2)
12.1.2	$24\times23\times22$ = 12 144	✓ $24\times23\times22$ ✓12 144 (2)
12.2.1	7×6×5×4×3×2×1 = 5 040	✓product/*produk* ✓5 040 (2)
12.2.2	(3×2×1)(5×4×3×2×1) = 720 **OR/*OF*** The five 'units' can be parked in 5×4×3×2×1 ways./*Die vyf 'eenhede' kan op 5×4×3×2×1 maniere geparkeer word.* The three silver cars can be parked in 3×2×1 ways./*Die drie silwer motors kan op 3×2×1 maniere parkeer word.* So there are (3×2×1)(5×4×3×2×1) = 720 ways to park the cars./*Dus is daar (3×2×1)(5×4×3×2×1) = 720 maniere om die motors te parkeer.* **OR/*OF*** Suppose for the moment the 3 silver cars are at one end./*Veronderstel die drie silwer motors is op die punt.* The 3 cars can be arranged in 3×2×1 = 6 ways./*Die 3 motors kan op 3×2×1 = 6 maniere gerangskik word.* For each of them the remaining four cars can be arranged in 4×3×2×1 = 24 ways./*Die 4 oorblywende motors kan op 4×3×2×1 = 24 maniere rangskik word.* So 6 × 24 = 144 ways if all 3 cars at one end./*Dus is daar 6 × 24 = 144 maniere as die 3 motors op die punt is.*   Together, the silver cars can only occupy 5 different positions amongst the 7 positions. ./*Saam kan die silwer motors slegs 5 verskillende posisies hê tussen die 7 moontlike posisies.* ∴ Total ways/*Totale getal maniere* = 5 × 144 = 720	✓3×2×1 ✓5×4×3×2×1 ✓720 (3) ✓5×4×3×2×1 ✓3×2×1 ✓720 (3) ✓6 × 24 = 144 ✓5 × 144 ✓720 (3) **[9]**

TOTAL/*TOTAAL*: 150

QUESTION/VRAAG 11

11.1	P(A or B) = P(A) + P(B) 0,57 = P(A) + 2P(A) 0,57 = 3P(A) P(A) = 0,19 $\therefore$ P(B) = 2(0,19) = 0,38	✓ P(A or B) = P(A) + P(B) ✓ P(A) = 0,19 ✓answer (3)
11.2.1		✓ first tier ✓ second tier ✓ probabilities ✓outcomes (4)
11.2.2	$P(AY) = \left(\frac{1}{2}\right)\left(\frac{2}{5}\right)$ $= \frac{1}{5}$	✓ answer (1)
11.2.3	$P(P) = \left(\frac{1}{2}\right)\left(\frac{3}{5}\right)+\left(\frac{1}{2}\right)\left(\frac{5}{9}\right)$ $=\frac{3}{10}+\frac{5}{18}$ $=\frac{26}{45}$	✓$\left(\frac{1}{2}\right)\left(\frac{3}{5}\right)$ ✓ $\left(\frac{1}{2}\right)\left(\frac{5}{9}\right)$ ✓ answer (3) **[11]**

QUESTION/VRAAG 12

12.1	<table><tr><td>5</td><td>4</td><td>3</td><td>2</td><td>1</td></tr></table> Number of different letter arrangements: *Aantal verskillende letter rangskikkings wat gevorm kan word:* 5! = 5x4x3x2x1 = 120	✓5! ✓120 (2)
12.2	S and T can be arranged in 2! different ways. The remaining three letters can be arranged in 3! different ways ∴ Total number of different letter arrangements having S and T as the first two letters = 2!.3! S *en* T *kan op* 2! *verskillende maniere rangskik word.* *Die 3 letters wat oorbly kan op* 3! *verskillende maniere rangskik word* ∴ *Totale aantal letterrangskikkings waarin* S *en* T *die eerste twee letters van die rangskikking sal wees* = 2!.3! $P(\text{having S and T as first two letters}) = \frac{2!.3!}{120}$ $= \frac{2.6}{120}$ $= \frac{1}{10}$	✓ 2! ✓ 3! ✓answer (3) **[5]**

TOTAL/*TOTAAL*: 150