



**Western Cape
Government**

FOR YOU

Education

INTER- DISTRICTS

**MATHEMATICS
GRADE 12**

PAPER 1
SEPTEMBER 2026

Stanmorephysics.com

MARKS: 150

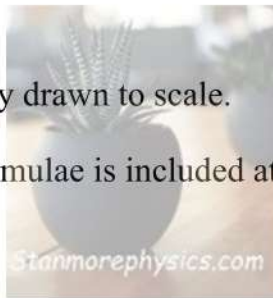
TIME: 3 hours

This question paper consists of 11 pages and 1 information sheet

INSTRUCTIONS AND INFORMATION

Read the following instructions carefully before answering the questions.

1. This question paper consists of 11 questions.
2. Answer ALL the questions in the SPECIAL ANSWER BOOK provided
3. Clearly show ALL calculations, diagrams, graphs, etc. that you have used in determining your answers.
4. Answers only will NOT necessarily be awarded full marks.
5. You may use an approved scientific calculator (non-programmable and non-graphical), unless stated otherwise.
6. If necessary, round off answers to TWO decimal places, unless stated otherwise.
7. Diagrams are NOT necessarily drawn to scale.
8. An information sheet with formulae is included at the end of the question paper.
9. Write neatly and legibly



QUESTION 11.1 Solve for x :

$$1.1.1 \quad x^2 + 3x = 10 \quad (3)$$

$$1.1.2 \quad 2x^2 = 7x + 3 \text{ (correct to TWO decimal places)} \quad (4)$$

$$1.1.3 \quad 3x^2 + 13x + 10 \geq 0 \quad (3)$$

$$1.1.4 \quad 2\sqrt{x+9} + 6 = x \quad (4)$$

1.2 Solve for x and y simultaneously if

$$\log_2(x + y) = 3 \text{ and } x^2 + 5xy + 6y^2 = 0 \quad (6)$$

1.3 If a and b are nonzero real numbers such that $a^2 = b(b + 1)$ and $b^2 = a + 1$ determine the value of $\frac{1}{a} + \frac{1}{b}$. (4)**[24]****QUESTION 2**2.1 The first three terms of an arithmetic sequence are $2k - 7$; $k + 8$ and $2k - 1$.2.1.1 Determine the value of k . Show ALL calculations. (3)2.1.2 If $k = 12$, determine the sum of the first 30 EVEN terms in the sequence. (4)2.2 A geometric series has a constant ratio of $\frac{1}{2}$ and a sum to infinity of 6.2.2.1 Determine the 7th term of the series. (4)2.2.2 Given: $\sum_{k=2}^p 3(2)^{1-k} = \frac{45}{16}$, determine the value of p . (5)2.2.3 If $\sum_{k=2}^{20} 3(2)^{1-k} = m$, write down $\sum_{k=2}^{20} 24(2)^{-k}$ in terms of m . (3)**[19]**

QUESTION 3

A quadratic sequence is given:

$$-14 ; 0 ; 10 ; 16 ; \dots$$

3.1 Determine the general term of the sequence in the form

$$T_n = an^2 + bn + c.$$

(3)

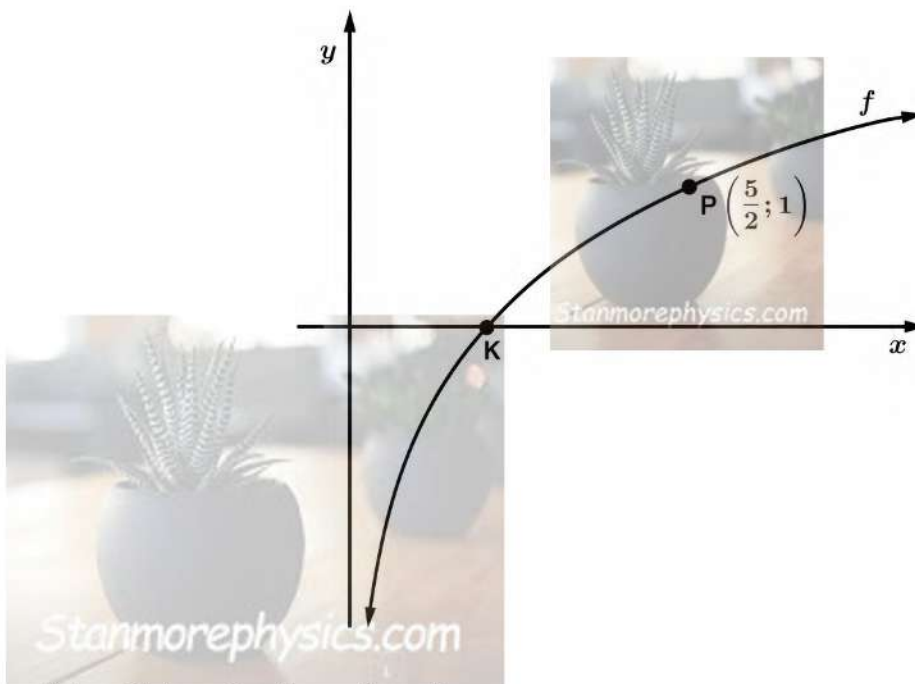
3.2 For which values of n will T_n be smaller than -110 .

(4)

[7]

QUESTION 4

In the diagram below, the function $f(x) = \log_a x$ is drawn with the point $P\left(\frac{5}{2}; 1\right)$ on the graph. K is the x -intercept of f .



4.1 Determine the value of a .

(2)

4.2 Write down the coordinates of K.

(2)

4.3 Determine the equation of f^{-1} , the inverse of f .

(2)

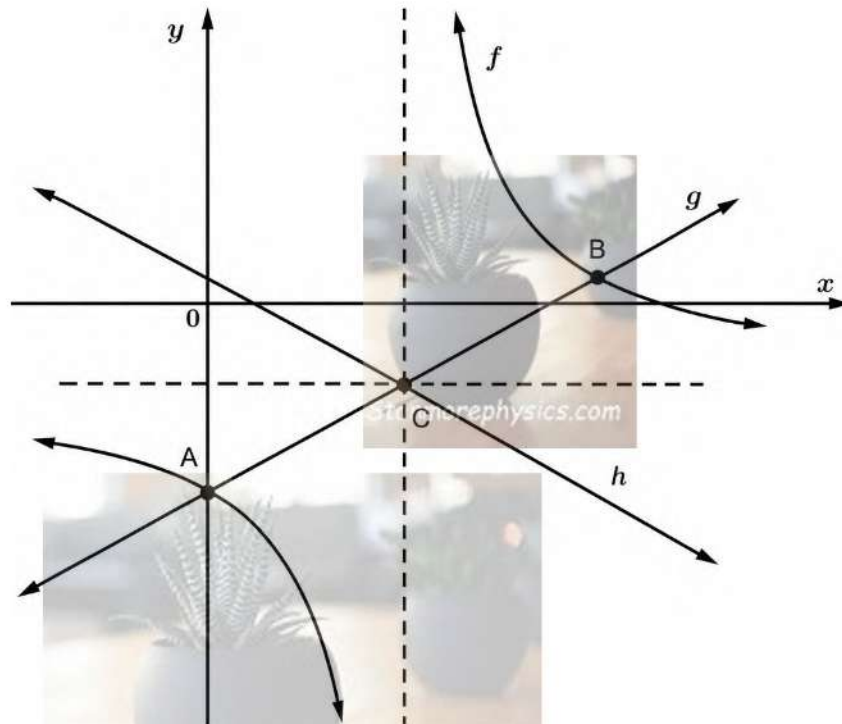
4.4 Sketch the graph of f^{-1} . Clearly indicate the asymptote and the intercepts with the axes. (3)

4.5 For which values of x will $f(x+3) \leq 1$. (2)

[11]

QUESTION 5

In the diagram below $f(x) = \frac{a}{x+p} + q$ with axes of symmetry $g(x) = x - 7$ and $h(x) = -x + 1$ are drawn. A is the y -intercept of both f and g .



5.1 Write down the coordinates of A. (2)

5.2 Determine the equation of f . (5)

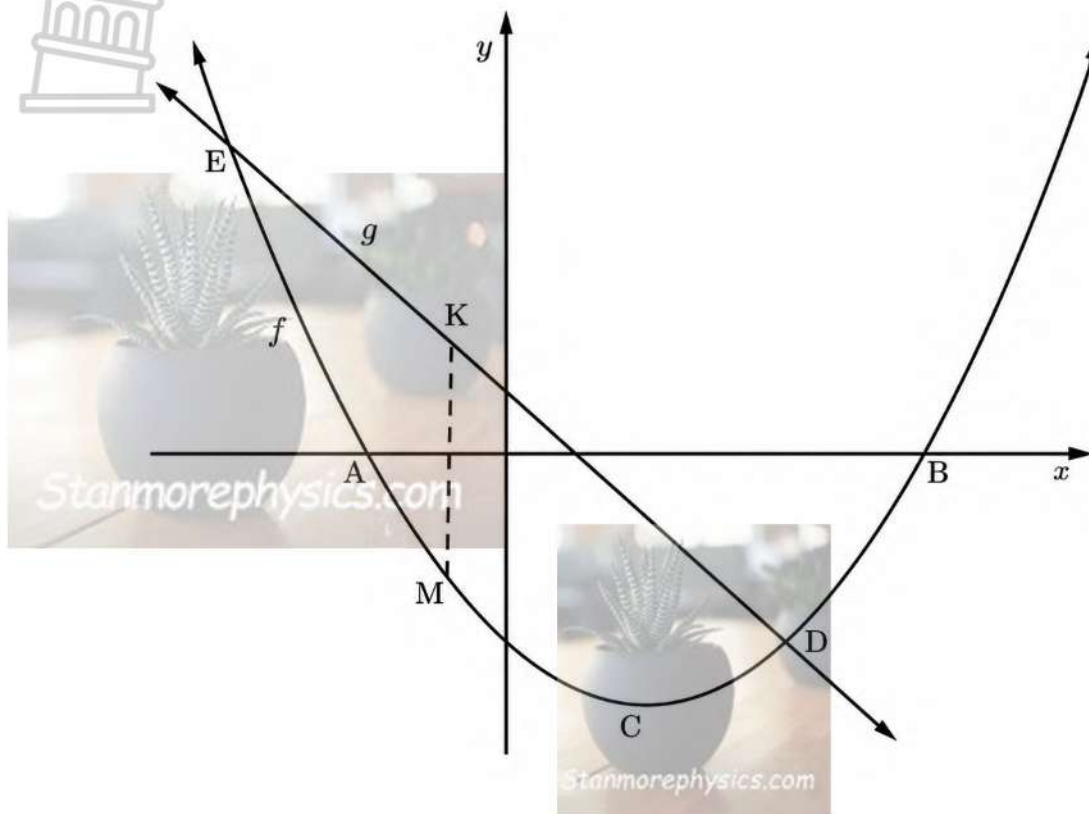
5.3 For which values of x will $f(x) \geq h(x)$? (1)

5.4 Calculate the distance AB. (4)

[12]

QUESTION 6

In the diagram below, the functions $f(x) = x^2 - 2x - 3$ and $g(x) = -2x + 1$ are given. The turning point of f is C and the x -intercepts of f are A and B. The graphs f and g intersect at D and E.



- 6.1 Determine the length AB. (2)
- 6.2 Determine the coordinates of C. (3)
- 6.3 K is a point on g and M is a point on f , between the points D and E. Determine the maximum length of KM if KM is parallel to the y -axis. (4)
- 6.4 Consider a new function h , where $f(x) = h'(x)$. For which values of x will h be increasing? (2)
- 6.5 Draw a sketch of h . Indicate only the x -values of the turning points and point of inflection. (4)

[15]

QUESTION 7

7.1 Susan invests a lump sum of R50 000 in a savings account for 6 years. The investment earns 9,35% p.a., compounded quarterly.

7.1.1 Determine the effective interest rate. (3)

7.1.2 Calculate the value of Susan's investment after 6 years. (2)

7.2 John invests R800 000 in a fund that earns interest at a rate of 14% p.a., compounded monthly. At the end of each month, he withdraws R10 000 from the fund. His first withdrawal is made one month after the initial investment.

7.2.1 How many withdrawals of R10 000 will John be able to make from this fund? (5)

7.2.2 Exactly four years after the initial investment, John decides to withdraw all the remaining money from his account and use it as a deposit towards a house.

(a) Calculate the value of the deposit, rounded to the nearest rand. (3)

(b) Calculate the price of the house to the nearest rand, if the deposit is exactly 30% of the purchase price of the house. (1)

[14]

QUESTION 8

8.1 Determine $f'(x)$ from first principles, if it is given that

$$f(x) = x^2 + x. \quad (5)$$

8.2 Determine:

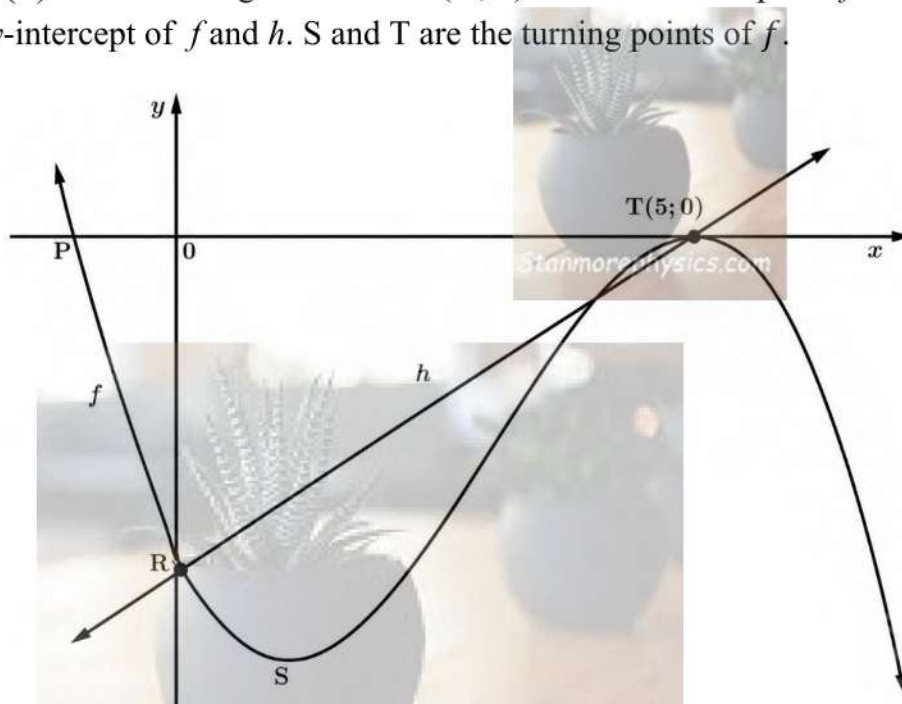
$$8.2.1 \quad D_x[-x^5 + 2x^{-3} - 5m^3] \quad (3)$$

$$8.2.2 \quad \frac{dy}{dx} \text{ if } y = \sqrt[4]{16x^3} + \frac{3}{x^2} \quad (4)$$

[12]

QUESTION 9

In the diagram below the function $f(x) = -x^3 + bx^2 + cx + d$ and $h(x) = 5x - 25$ is given. P and T(5; 0) are the x-intercepts of f . R is the common y-intercept of f and h . S and T are the turning points of f .



9.1 Write down the coordinates of R, the y-intercept of h . (1)

9.2 Show that $b = 9, c = -15$ and $d = -25$. (4)

9.3 Determine the coordinates of S. (4)

9.4 A tangent to f is drawn at a point Q on the curve. This tangent passes through R. Determine the coordinates of Q, if Q is not the point R itself. (4)

[13]

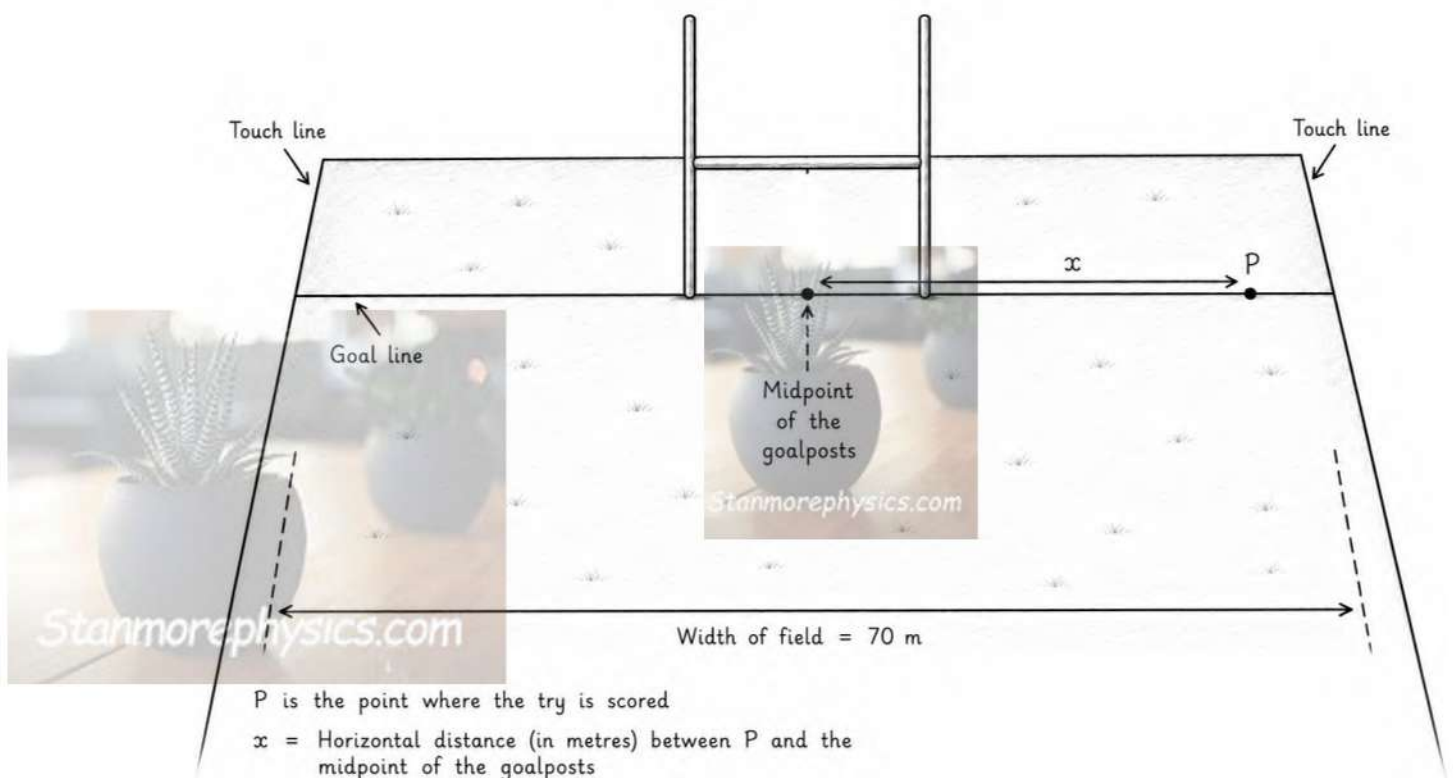
QUESTION 10

An **attack-rating** is used in rugby to show the probability that an offensive move will end in a successful try.

The **attack-rating** (A) is given by:

$$A(x) = \frac{600 + 40x - x^2}{1200}; 0 \leq x \leq 35$$

Where x is the distance between the midpoint of the goalposts and P, the point where the try was scored.



10.1 A rugby field is 70m wide. Calculate the **attack-rating** (A) of a try scored on the touch line. (2)

10.2 Determine the value of x , where the **attack-rating** (A) will be a maximum. (4)

10.3 For the team's current kicker the probability of a successful conversion

is given by: $C(x) = 0,9 - \frac{x}{100}$

If it is given that $C(x)$ and $A(x)$ are independent, determine the probability that a try will be scored and a successful conversion at the point calculated in QUESTION 10.2. (2)
[8]

QUESTION 11

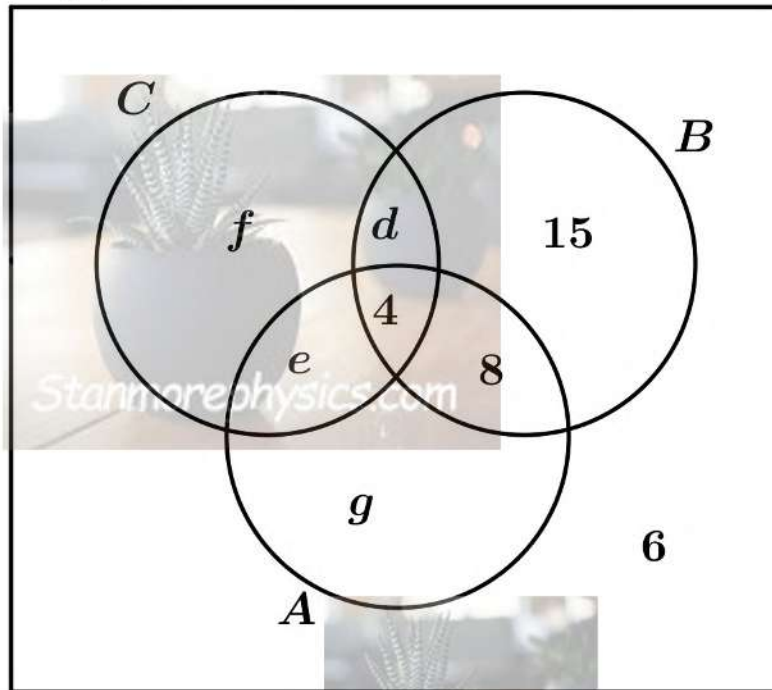
11.1 Research into driving under the influence of alcohol was carried out. Alcohol levels are determined by three methods: **alcohol content of breath (A)**, **blood-alcohol concentration (B)** and **certificates issued by doctors (C)**. The list below summarises information from traffic authorities in 54 countries on how alcohol levels are measured.

- 4 countries use all three methods (A, B and C).
- 12 countries use the alcohol content of breath (A) and blood-alcohol concentration (B).
- 9 countries use blood-alcohol concentration (B) and certificates issued by doctors (C).
- 8 countries use the alcohol content of breath (A) and certificates issued by doctors (C).
- 21 countries use the alcohol content of breath (A).
- 32 countries use blood-alcohol concentration (B).
- 20 countries use certificates issued by doctors (C).
- 6 countries use none of these methods.

Below is a partially completed Venn diagram representing the above information.



$$n(s) = 54$$



11.1.1 Use the given information and the Venn diagram to determine the values of d , e , f and g . (4)

11.1.2 For a randomly selected country, determine $P(B \text{ or } C)$ (2)

11.2 Ten runners, A to J, complete a race.

11.2.1 In how many different orders can the 10 runners finish the race? (1)

11.2.2 In how many of the possible arrangements do A, B and C finish in the first three positions, regardless of the order? (2)

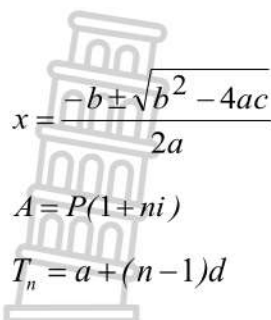
11.2.3 In how many different ways can the gold, silver and bronze medals be awarded to the 10 runners? (2)

11.2.4 Determine the probability that H and G do not finish consecutively. (4)

[15]

TOTAL [150]

INFORMATION SHEET



$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

$$A = P(1 + ni)$$

$$A = P(1 - ni)$$

$$A = P(1 - i)^n$$

$$A = P(1 + i)^n$$

$$T_n = a + (n - 1)d$$

$$S_n = \frac{n}{2}[2a + (n - 1)d]$$

$$T_n = ar^{n-1}$$

$$S_n = \frac{a(r^n - 1)}{r - 1} ; r \neq 1$$

$$S_\infty = \frac{a}{1 - r} ; -1 < r < 1$$

$$F = \frac{x[(1+i)^n - 1]}{i}$$

$$P = \frac{x[1 - (1+i)^{-n}]}{i}$$

$$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$$

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

$$M\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$y = mx + c$$

$$y - y_1 = m(x - x_1)$$

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

$$m = \tan \theta$$

$$(x - a)^2 + (y - b)^2 = r^2$$

$$\text{In } \triangle ABC: \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$\text{area } \triangle ABC = \frac{1}{2}ab \sin C$$

$$\sin(\alpha + \beta) = \sin \alpha \cos \beta + \cos \alpha \sin \beta$$

$$\cos(\alpha + \beta) = \cos \alpha \cos \beta - \sin \alpha \sin \beta$$

$$\cos 2\alpha = \begin{cases} \cos^2 \alpha - \sin^2 \alpha \\ 1 - 2\sin^2 \alpha \\ 2\cos^2 \alpha - 1 \end{cases}$$

$$\sin(\alpha - \beta) = \sin \alpha \cos \beta - \cos \alpha \sin \beta$$

$$\cos(\alpha - \beta) = \cos \alpha \cos \beta + \sin \alpha \sin \beta$$

$$\sin 2\alpha = 2 \sin \alpha \cos \alpha$$

$$\bar{x} = \frac{\sum fx}{n}$$

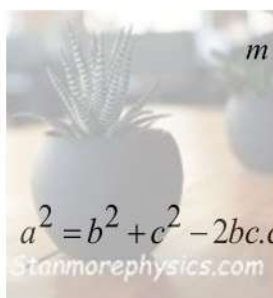
$$\sigma^2 = \frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n}$$

$$P(A) = \frac{n(A)}{n(S)}$$

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

$$\hat{y} = a + bx$$

$$b = \frac{\sum (x - \bar{x})(y - \bar{y})}{\sum (x - \bar{x})^2}$$



$$a^2 = b^2 + c^2 - 2bc \cos A$$



**Western Cape
Government**

Education

FOR YOU

**NATIONAL SENIOR CERTIFICATE/
NASIONALE SENIOR SERTIFIKAAT**

GRADE 12 / GRAAD 12

**MATHEMATICS P1/ WISKUNDE V1
SEPTEMBER 2026
MARKING GUIDELINES / NASIENRIGLYNE**

MARKS / PUNTE: 150

These marking guidelines consist of 18 pages.

Hierdie nasienriglyne bestaan uit 18 bladsye.

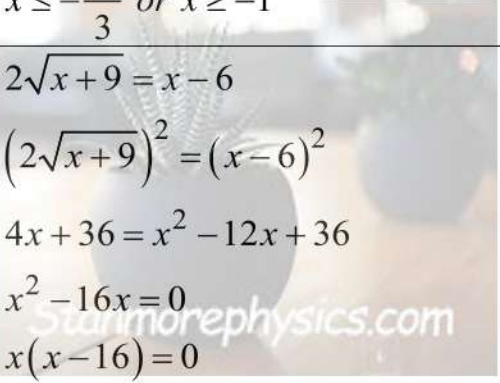
NOTE:

- If a candidate answers a question **TWICE**, only mark the **FIRST** attempt.
- Consistent Accuracy applies in all aspects of the marking guidelines.

LET WEL:

- Indien 'n kandidaat 'n vraag **TWEE** keer beantwoord, sien slegs die **EERSTE** poging na.
- Volgehoue akkuraatheid is **DEURGAANS** op **ALLE** aspekte van die nasienriglyne van toepassing.

QUESTION 1/VRAAG 1

1.1.1	$x^2 + 3x - 10 = 0$ $(x + 5)(x - 2) = 0$ $x = -5 \text{ or } x = 2$	 ✓ factorise ✓✓ answers (3)
1.1.2	$2x^2 - 7x - 3 = 0$ $x = \frac{-(-7) \pm \sqrt{(-7)^2 - 4(2)(-3)}}{2(2)}$ $x = 3,89 \text{ or } x = -0,39$	 ✓ std form ✓ sub ✓✓ answers (4)
1.1.3	$3x^2 + 13x + 10 \geq 0$ $(3x + 10)(x + 1) \geq 0$ $cv: x = -\frac{10}{3} \text{ or } x = -1$ $x \leq -\frac{10}{3} \text{ or } x \geq -1$	 ✓ cv / factors ✓✓ answers (3)
1.1.4	$2\sqrt{x+9} = x - 6$ $(2\sqrt{x+9})^2 = (x-6)^2$ $4x + 36 = x^2 - 12x + 36$ $x^2 - 16x = 0$ $x(x - 16) = 0$ $x \neq 0 \text{ or } x = 16$	 ✓ isolate surd ✓ square both sides ✓ std form ✓ answer with selection (4)

1.2	$x + y = 8$ $x = 8 - y$ $(8 - y)^2 + 5(8 - y)y + 6y^2 = 0$ $64 - 16y + y^2 + 40y - 5y^2 + 6y^2 = 0$ $2y^2 + 24y + 64 = 0$ $y^2 + 12y + 32 = 0$ $(y + 8)(y + 4) = 0$ $y = -8 \text{ or } y = -4$ $x = 16 \text{ or } x = 12$ OR $x + y = 8$ $y = 8 - x$ $x^2 + 5x(8 - x) + 6(8 - x)^2 = 0$ $x^2 + 40x - 5x^2 + 384 - 96x + 6x^2 = 0$ $2x^2 - 56x + 384 = 0$ $x^2 - 28x + 192 = 0$ $(x - 16)(x - 12) = 0$ $x = 16 \text{ or } x = 12$ $y = -8 \text{ or } y = -4$ OR $x + y = 8$ $x = 8 - y$ $x^2 + 5xy + 6y^2 = 0$ $(x + 3y)(x + 2y) = 0$ $x = -3y \text{ or } x = -2y$ $8 - y = -3y \text{ or } 8 - y = -2y$ $2y = -8 \text{ or } y = -8$ $y = -4 \text{ or } y = -8$ $x = 12 \text{ or } x = 16$	✓ equation ✓ x subject ✓ substitute ✓ standard form ✓ both y values ✓ both x values ✓ equation ✓ y subject ✓ substitute ✓ standard form ✓ both x values ✓ both y values ✓ equation ✓ x subject of formula ✓ factorise ✓ solve ✓ both y values ✓ both x values (6)
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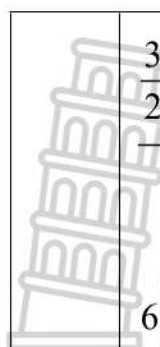
1.3	$\frac{1}{a} + \frac{1}{b} = \frac{b+a}{ab}$ $a = b^2 - 1$ $= (b+1)(b-1)$ from: $a^2 = b(b+1)$ $a(b+1)(b-1) = b(b+1)$ $\therefore a(b-1) = b$ $\therefore ab = b+a$ $\frac{1}{a} + \frac{1}{b} = \frac{b+a}{b+a} = 1$	✓ a ✓ sub ✓ simplify ✓ answer (4)
		[24]

QUESTION 2/VRAAG 2

2.1.1	$\begin{array}{ccc} 2k-7 & k+8 & 2k-1 \\ & -k+15 & k-9 \end{array}$ $-k+15 = k-9$ $-2k = -24$ $k = 12$	✓ first diff ✓ equate ✓ answer (3)
2.1.2	$\begin{array}{cccc} 20 & 26 & 32 & \dots \end{array}$ $S_{30} = \frac{30}{2} [2(20) + (30-1)(6)]$ $= 3210$ OR $\begin{array}{cccc} 20 & 26 & 32 & \dots \end{array}$ $T_{30} = 20 + (30-1)(6)$ $= 194$ $S_{30} = \frac{30}{2} [20 + 194]$ $= 3210$	✓ new sequence ✓ a and d ✓ sub ✓ answer ✓ new sequence ✓ a and l ✓ sub ✓ answer (4)

2.2.1	$\frac{a}{1 - \frac{1}{2}} = 6$ $\frac{a}{\frac{1}{2}} = 6$ $a = 3$	✓ sub ✓ a ✓ sub ✓ answer (4)
2.2.2	$n = p - 2 + 1$ $n = p - 1$ $\frac{3\left(\left(\frac{1}{2}\right)^{p-1} - 1\right)}{\left(\frac{1}{2}\right)^{-1} - 1} = \frac{45}{16}$ $\left(\frac{1}{2}\right)^{p-1} - 1 = -\frac{15}{16}$ $\left(\frac{1}{2}\right)^{p-1} = \frac{1}{16}$ $\left(\frac{1}{2}\right)^{p-1} = \left(\frac{1}{2}\right)^4$ $p = 5$	✓ n ✓ $r = \frac{1}{2}$ ✓ sub ✓ simplify ✓ answer (5)

2.2.3	$\sum_{k=2}^{20} 3(2)^{1-k} = m$ $\frac{3}{2} + \frac{3}{4} + \frac{3}{8} + \dots + \frac{3}{2^{19}} = m$ $\sum_{k=2}^{20} 24(2)^{-k} = 6 + 3 + \frac{3}{2} + \dots + \frac{24}{2^{20}}$ $= 4 \left(\frac{3}{2} + \frac{3}{4} + \frac{3}{8} + \dots + \frac{3}{2^{19}} \right)$ $= 4m$ OR $\sum_{k=2}^{20} 3(2)^{1-k} = m$ $\sum_{k=2}^{20} 6(2)^{-k} = m$ $\sum_{k=2}^{20} 24(2)^{-k} = 4m$ OR $\sum_{k=2}^{20} 24(2)^{-k} = \sum_{k=2}^{20} 4 \times 3 \times 2(2)^{-k}$ $= 4 \sum_{k=2}^{20} 3 \times 2(2)^{-k}$ $= 4 \sum_{k=2}^{20} 3(2)^{1-k} = 4m$ OR	✓ expand ✓ expand ✓ answer ✓ $\sum_{k=2}^{20} 6(2)^{-k} = m$ ✓ $\sum_{k=2}^{20} 4 \times 6(2)^{-k}$ ✓ answer ✓ $\sum_{k=2}^{20} 4 \times 3 \times 2(2)^{-k}$ ✓ $4 \sum_{k=2}^{20} 3 \times 2(2)^{-k}$ ✓ answer ✓ sub and answer
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	$\frac{\frac{3}{2} \left(\left(\frac{1}{2} \right)^{20} - 1 \right)}{\left(\frac{1}{2} \right) - 1} = 3 = m$ $\frac{6 \left(\left(\frac{1}{2} \right)^{20} - 1 \right)}{\left(\frac{1}{2} \right) - 1} = 12$ $12 = 4 \times 3 = 4m$	✓ sub and answer ✓ answer (3)
		[19]

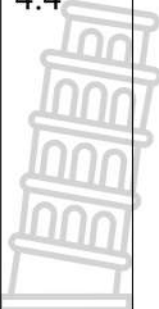
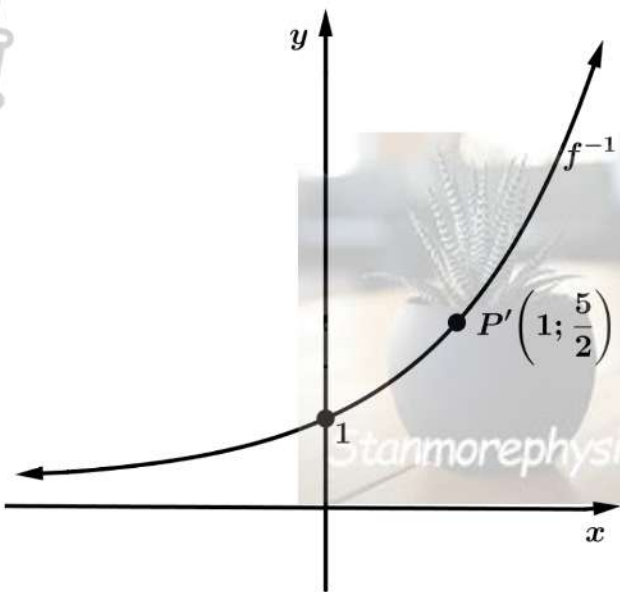


QUESTION 3/VRAAG 3

3.1	$\begin{array}{rrrr} -14 & 0 & 10 & 16 \\ & 14 & 10 & 6 \\ & & -4 & -4 \end{array}$ $2a = -4 \quad 3(-2) + b = 14 \quad -2 + 20 + c = -14$ $a = -2 \quad b = 20 \quad c = -32$ $T_n = -2n^2 + 20n - 32$	$\checkmark \quad a$ $\checkmark \quad b$ $\checkmark \quad c$ (3)
3.2	$-2n^2 + 20n - 32 < -110$ $-2n^2 + 20n + 78 < 0$ $n^2 - 10n - 39 > 0$ $(n+3)(n-13) > 0$ $n < -3 \text{ or } n > 13$ $\therefore n > 13$	$\checkmark \quad T_n < -110$ $\checkmark \quad \text{std form}$ $\checkmark \quad \text{factors}$ $\checkmark \quad \text{selection}$ (4)
		[7]

QUESTION 4/VRAAG 4

4.1	$1 = \log_a \frac{5}{2}$ $a = \frac{5}{2}$	$\checkmark \quad \text{sub}$ $\checkmark \quad \text{answer}$ (2)
4.2	$K(1;0)$	$\checkmark \checkmark \quad \text{answer}$ (2)
4.3	$x = \log_{\frac{5}{2}} y$ $y = \left(\frac{5}{2}\right)^x$ or $x = \left(\frac{5}{2}\right)^y$ $y = \left(\frac{5}{2}\right)^x$	$\checkmark \quad \text{swop } x \text{ and } y$ $\checkmark \quad \text{expo form}$ $\checkmark \quad \text{expo form}$ $\checkmark \quad \text{swop } x \text{ and } y$ (2)

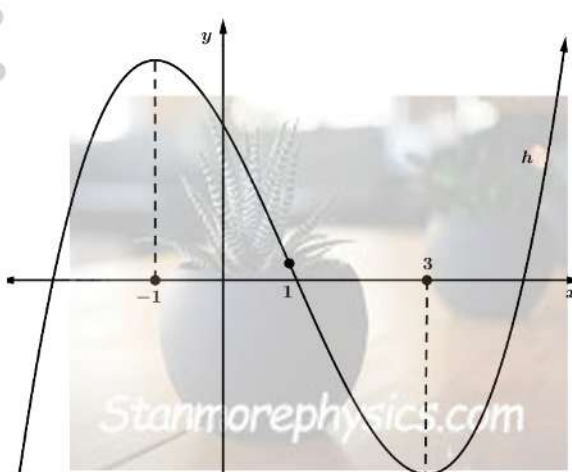
4.4 		✓ intercept ✓ asymptote ✓ shape (3)
4.5	$-3 < x \leq -\frac{1}{2}$	✓ ~~B~~ answer (2)
		[11]

QUESTION 5/VRAAG 5

5.1	$A(0; -7)$	✓ x ✓ y	(2)
5.2	$x - 7 = -x + 1$ $2x = 8$ $x = 4$ $y = -3$ $C(4; -3)$ $f(x) = \frac{a}{x - 4} - 3$ $-7 = \frac{a}{0 - 4} - 3$ $-4 = \frac{a}{-4}$ $a = 16$	✓ equate ✓ x ✓ y ✓ sub into equn ✓ a	(5)
5.3	$x > 4$	✓ answer	(1)
5.4	$x - 7 = \frac{16}{x - 4} - 3$ $x - 4 = \frac{16}{x - 4}$ $x^2 - 8x + 16 = 16$ $x(x - 8) = 0$ $x = 0$ or $x = 8$ $A(0; -7)$ $B(8; 1)$ $AB = \sqrt{(0 - 8)^2 + (-7 - 1)^2}$ $= 8\sqrt{2}$	✓ equate ✓ coord of B ✓ sub ✓ answer	(4)
			[12]

QUESTION 6/VRAAG 6

6.1	$x^2 - 2x - 3 = 0$ $(x+1)(x-3) = 0$ $x = -1 \text{ or } x = 3$ $AB = 4$	✓ $y = 0$ ✓ answer (2)
6.2	$x = -\frac{-2}{2(1)}$ $x = 1$ $y = (1)^2 - 2(1) - 3$ $y = -4$ $C(1; -4)$	✓ sub ✓ x value ✓ y value (3)
6.3	$KM = -2x + 1 - (x^2 - 2x - 3)$ $= -x^2 + 4$ $x = -\frac{(0)}{2(-1)}$ $x = 0$ $KM_{\max} = -(0)^2 + 4$ $= 4$ OR $KM = -2x + 1 - (x^2 - 2x - 3)$ $= -x^2 + 4$ $f'(x) = -2x$ $-2x = 0$ $x = 0$ $KM_{\max} = -(0)^2 + 4$ $= 4$	✓ $f(x) - g(x)$ ✓ simplify ✓ x ✓ answer (4) ✓ $f(x) - g(x)$ ✓ simplify ✓ x ✓ answer (4)
6.4	$x < -1 \text{ or } x > 3$	✓ $x < -1$ ✓ $x > 3$ (2)

6.5		✓ shape ✓✓ tps ✓ concavity (4)
		[15]

QUESTION 7/VRAAG 7

7.1.1	$1 + i_{eff} = \left(1 + \frac{9,35}{400}\right)^4$ $\therefore i_{eff} = \left(1 + \frac{9,35}{400}\right)^4 - 1$ $\frac{r}{100} = 0,096829$ $\therefore r = 9,68\%$ 	✓ <i>i</i> ✓ sub ✓ answer (3)
7.1.2	$A = 50\,000 \left(1 + \frac{0,0935}{4}\right)^{24}$ $= R87\,057,32$ OR $A = 50\,000 \left(1 + \frac{9,68}{100}\right)^6$ $= R87\,043,16$	✓ sub ✓ answer ✓ sub ✓ answer (2)

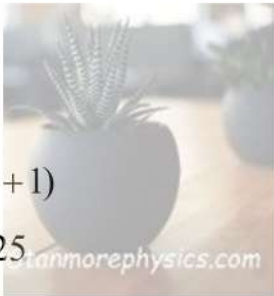
7.2.1 $800\,000 = \frac{10\,000 \left[1 - \left(1 + \frac{14}{1200} \right)^{-n} \right]}{\left(\frac{14}{1200} \right)}$ $\frac{14}{15} = 1 - \left(1 + \frac{14}{1200} \right)^{-n}$ $\left(1 + \frac{14}{1200} \right)^{-n} = \frac{1}{15}$ $-n = \log_{\left(1 + \frac{14}{1200} \right)} \frac{1}{15}$ $-n = -233,4699$ $n = 233,4699$ 233 withdrawals of R10 000	✓ i ✓ sub into Pv ✓ logs ✓ answer ✓ withdrawals (5)
7.2.2a $n = 185,4699$ $Pv = \frac{10\,000 \left[1 - \left(1 + \frac{14}{1200} \right)^{-185,4699} \right]}{\left(\frac{14}{1200} \right)}$ = R757 428 OR $Fv = \frac{10\,000 \left[\left(1 + \frac{14}{1200} \right)^{48} - 1 \right]}{\left(\frac{14}{1200} \right)}$ = R638 577,36 $A = 800\,000 \left(1 + \frac{14}{1200} \right)^{48} = R1\,396\,005,54$ $A - Fv = R757\,428$	✓ n ✓ sub ✓ answer ✓ n ✓ sub into both formula ✓ answer (3)
7.2.2b House Price = $757\,428 \times \frac{100}{30}$ = R2 524 760	✓ answer (1)
	[14]

QUESTION 8/VRAAG 8

8.1	$f(x) = x^2 + x$ $f(x+h) = (x+h)^2 + (x+h)$ $= x^2 + 2xh + h^2 + x + h$ $f(x+h) - f(x) = 2xh + h^2 + h$ $f'(x) = \lim_{h \rightarrow 0} \frac{2xh + h^2 + h}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x + h + 1)}{h}$ $= \lim_{h \rightarrow 0} (2x + h + 1)$ $= 2x + 1$ OR $f'(x) = \lim_{h \rightarrow 0} \frac{(x+h)^2 + (x+h) - (x^2 + x)}{h}$ $= \lim_{h \rightarrow 0} \frac{x^2 + 2xh + h^2 + x + h - x^2 - x}{h}$ $= \lim_{h \rightarrow 0} \frac{2xh + h^2 + h}{h}$ $= \lim_{h \rightarrow 0} \frac{h(2x + h + 1)}{h}$ $= \lim_{h \rightarrow 0} (2x + h + 1)$ $= 2x + 1$	↻ $f(x+h)$ ↻ simplify ↻ sub ↻ factorise ↻ answer ↻ $f(x+h)$ ↻ $f(x+h) - f(x)$ ↻ simplify ↻ factorise ↻ answer (5)
8.2.1	$D_x[-x^5 + 2x^{-3} - 5m^3]$ $= -5x^4 - 6x^{-4}$	✓ $-5x^4$ ✓ $-6x^{-4}$ ✓ 0 (3)

8.2.2	$y = \sqrt[4]{16x^3} + \frac{3}{x^2}$ $y = 2x^{\frac{3}{4}} + 3x^{-2}$ $\frac{dy}{dx} = \frac{3}{2}x^{-\frac{1}{4}} - 6x^{-3}$	 ✓✓ ✓✓	(4)
			[12]

QUESTION 9/VRAAG 9

9.1	$R(0; -25)$	answer	(1)
9.2	$f(x) = -(x-5)^2(x-P)$ $-25 = -(0-5)^2(0-P)$ $-25 = 25P$ $P = -1$ $f(x) = -(x-5)^2(x+1)$ $= -(x^2 - 10x + 25)(x+1)$ $= -x^3 + 9x^2 - 15x - 25$  OR $d = -25 \text{ (y-intercept)}$ $-(5)^3 + b(5)^2 + c(5) - 25 = 0$ $25b + 5c = 150$ $5b + c = 30 \quad \dots 1$ $-3(5)^2 + 2b(5) + c = 0$ $10b + c = 75 \quad \dots 2$ $2 - 1:$ $5b = 45$ $b = 9$ sub into 1 or 2 $c = -15$	✓ sub roots ✓ sub R ✓ P ✓ expansion ✓ $f(5) = 0$ ✓ ✓ $f'(5) = 0$ ✓ solve	(4)

9.3	$f'(x) = -3x^2 + 18x - 15$ $-3x^2 + 18x - 15 = 0$ $x^2 - 6x + 5 = 0$ $(x - 5)(x - 1) = 0$ $x = 5 \text{ or } x = 1$ $y = 0 \quad y = -32$ $S(1; -32)$	✓ $f'(x)$ ✓ $= 0$ ✓ select x ✓ y value (4)
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9.4	$m_T = -3x^2 + 18x - 15$ at tangential or intersection point $ax^3 + bx^2 + cx + d = mx + c$ $-x^3 + 9x^2 - 15x - 25 = (-3x^2 + 18x - 15)x - 25$ $-x^3 + 9x^2 - 15x - 25 = -3x^3 + 18x^2 - 15x - 25$ $2x^3 - 9x^2 = 0$ $x^2(2x - 9) = 0$ $x \neq 0 \text{ or } x = \frac{9}{2}$ (not point R) $f\left(\frac{9}{2}\right) = -\frac{11}{8}$ $Q\left(\frac{9}{2}; -\frac{11}{8}\right)$	✓ gradient as m ✓ equate ✓ select x value ✓ y value (4)
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QUESTION 10/VRAAG 10

10.1	$A(35) = \frac{600 + 40(35) - (35)^2}{1200}$ $= 0,65$	✍ sub ✍ answer (2)
10.2	$A(x) = \frac{600 + 40x - x^2}{1200}$ $= \frac{1}{2} + \frac{1}{30}x - \frac{1}{1200}x^2$ $A'(x) = \frac{1}{30} - \frac{1}{600}x$ $\frac{1}{30} - \frac{1}{600}x = 0$ $\frac{1}{600}x = \frac{1}{30}$ $x = 20$	✓ simplify ✓ $A'(x)$ ✓ $= 0$ ✓ answer (4)
10.3	$P(A \text{ and } C) = P(A) \times P(C)$ $= \left(\frac{600 + 40(20) - (20)^2}{1200} \right) \left(0,9 - \frac{20}{100} \right)$ $= \left(\frac{5}{6} \right) \left(\frac{7}{10} \right)$ $= \frac{35}{60}$	✓ sub ✓ answer (2)
		[8]

QUESTION 11/VRAAG 11

11.1.1	$d = 5$ $e = 4$ $f = 7$ $g = 5$	✓ d ✓ e ✓ f ✓ g	(4)
11.1.2	$\frac{43}{54}$ or 0,7963 or 79,63%	✓ 43 ✓ 54	(2)
11.2.1	$10! = 3\,628\,800$	✓ answer	(1)
11.2.2	$3! \times 7! = 30240$	✓ $3!$ ✓ $7!$	(2)
11.2.3	$10 \times 9 \times 8 = 720$	✓✓ answer	(2)
11.2.4	Probability consecutive = $\frac{2! \times 9!}{10!}$ $= \frac{1}{5}$ $P(GH') = 1 - \frac{1}{5}$ $= \frac{4}{5}$ OR GH consecutive = $9! \times 2!$ not consecutive = $10! - 9! \times 2!$ Probability = $\frac{10! - 9! \times 2!}{10!}$ $= \frac{4}{5}$	✓ $9! \times 2!$ ✓ 10! in denom ✓ $1 - \frac{1}{5}$ ✓ answer ✓ $9! \times 2!$ ✓ $10! - 9! \times 2!$ ✓ 10! in denom ✓ answer	(4)
			[15]