



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

SENIOR CERTIFICATE EXAMINATIONS ***SENIORSERTIFIKAAT-EKSAMEN***

MATHEMATICS P1/*WISKUNDE VI*

2018

MARKING GUIDELINES/*NASIENRIGLYNE*

MARKS: 150
PUNTE: 150

These marking guidelines consist of 19 pages.
Hierdie nasienriglyne bestaan uit 19 bladsye.

NOTE:

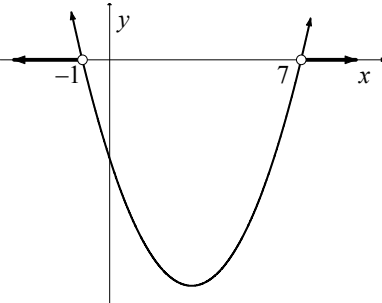
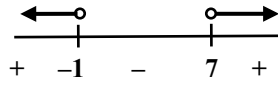
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent accuracy applies in ALL aspects of the marking guidelines.

LET WEL:

- Indien 'n kandidaat 'n vraag TWEE KEER beantwoord, merk slegs die EERSTE poging.
- Volgehoue akkuraatheid is op ALLE aspekte van die nasienriglyne van toepassing.

QUESTION/VRAAG 1

1.1.1	$(3x - 1)(x + 4) = 0$ $x = \frac{1}{3} \text{ or } x = -4$	$\checkmark x = \frac{1}{3}$ $\checkmark x = -4$ <p style="text-align: right;">(2)</p>
1.1.2	$2x^2 + 9x - 14 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-9 \pm \sqrt{9^2 - 4(2)(-14)}}{2(2)}$ $= \frac{-9 \pm \sqrt{193}}{4}$ $x = 1,22 \text{ or } x = -5,72$ <p>OR/OF</p> $x^2 + \frac{9}{2}x + \frac{81}{16} = 7 + \frac{81}{16}$ $\left(x + \frac{9}{4}\right)^2 = \frac{193}{16}$ $x + \frac{9}{4} = \pm \frac{\sqrt{193}}{4}$ $x = \frac{-9 \pm \sqrt{193}}{4}$ $x = 1,22 \text{ or } x = -5,72$	$\checkmark \text{ substitution into correct formula}$ $\checkmark \text{ simplification}$ $\checkmark x = 1,22$ $\checkmark x = -5,72$ <p style="text-align: right;">(4)</p> <p>OR/OF</p> $\checkmark \text{ for adding } \frac{81}{16} \text{ on both sides}$ $\checkmark \text{ simplification}$ $\checkmark x = 1,22$ $\checkmark x = -5,72$ <p style="text-align: right;">(4)</p>
1.1.3	$\sqrt{3 - 26x} = 3x$ $3 - 26x = 9x^2$ $9x^2 + 26x - 3 = 0$ $(9x - 1)(x + 3) = 0$ $x = \frac{1}{9} \text{ or } x = -3$ <p style="text-align: center;">N/A</p>	$\checkmark 3 - 26x = 9x^2$ $\checkmark \text{ standard form}$ $\checkmark \text{ factors}$ $\checkmark \text{ answer with selection}$ <p style="text-align: right;">(4)</p>

<p>1.1.4</p>	$(x-1)(x-4) > x+11$ $x^2 - 5x + 4 > x + 11$ $x^2 - 6x - 7 > 0$ $(x-7)(x+1) > 0$  <p style="text-align: center;">OR</p>  <p>$x < -1$ or $x > 7$</p>	<p>✓ $x^2 - 5x + 4$</p> <p>✓ standard form</p> <p>✓ factors</p> <p>✓✓ $x < -1$ or $x > 7$</p> <p style="text-align: right;">(5)</p>
<p>1.2</p>	$\frac{4\sqrt{x^7} - 5\sqrt{x^7}}{\sqrt{x}}$ $= \frac{-\sqrt{x^7}}{\sqrt{x}}$ $= \frac{-x^{\frac{7}{2}}}{x^{\frac{1}{2}}}$ $= -x^3$ <p>OR/OF</p> $\frac{\sqrt{x^7}(4-5)}{\sqrt{x}}$ $= \sqrt{x^6}(-1)$ $= -x^3$ <p>OR/OF</p> $\frac{(16x^7)^{\frac{1}{2}} - (25x^7)^{\frac{1}{2}}}{x^{\frac{1}{2}}}$ $= \frac{4x^{\frac{7}{2}} - 5x^{\frac{7}{2}}}{x^{\frac{1}{2}}}$ $= \frac{-x^{\frac{7}{2}}}{x^{\frac{1}{2}}}$ $= -x^3$	<p>✓ $4\sqrt{x^7} - 5\sqrt{x^7}$</p> <p>✓ $-\sqrt{x^7}$</p> <p>✓ $-x^3$</p> <p style="text-align: right;">(3)</p> <p>OR/OF</p> <p>✓ $\sqrt{x^7}(4-5)$</p> <p>✓ $\sqrt{x^6}(-1)$</p> <p>✓ $-x^3$</p> <p style="text-align: right;">(3)</p> <p>OR/OF</p> <p>✓ $\frac{4x^{\frac{7}{2}} - 5x^{\frac{7}{2}}}{x^{\frac{1}{2}}}$</p> <p>✓ $-x^{\frac{7}{2}}$</p> <p>✓ $-x^3$</p> <p style="text-align: right;">(3)</p>

<p>1.3</p> $x - 2y - 3 = 0$ $x = 2y + 3 \dots\dots\dots(1)$ $xy = 9 \dots\dots\dots(2)$ <p>Substitute (1) into (2)</p> $(2y + 3)y = 9$ $2y^2 + 3y = 9$ $2y^2 + 3y - 9 = 0$ $(2y - 3)(y + 3) = 0$ $y = \frac{3}{2} \text{ or } y = -3$ $x = 6 \text{ or } x = -3$ <p>OR/OF</p> $y = \frac{x - 3}{2} \dots\dots\dots(1)$ $xy = 9 \dots\dots\dots(2)$ <p>Substitute (1) into (2)</p> $x\left(\frac{x - 3}{2}\right) = 9$ $x^2 - 3x = 18$ $x^2 - 3x - 18 = 0$ $(x - 6)(x + 3) = 0$ $x = 6 \text{ or } x = -3$ $y = \frac{3}{2} \text{ or } y = -3$ <p>OR/OF</p> $x - 2y - 3 = 0$ $x = 2y + 3 \dots\dots\dots(1)$ $y = \frac{9}{x} \dots\dots\dots(2)$ <p>Substitute (2) into (1)</p> $x = 2\left(\frac{9}{x}\right) + 3$ $x^2 - 2(9) - 3x = 0$ $x^2 - 3x - 18 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-3 \pm \sqrt{(-3)^2 - 4(1)(-18)}}{2(1)}$ $= \frac{-3 \pm \sqrt{81}}{2}$ $x = 6 \text{ or } x = -3$ $y = \frac{9}{6} = 1,5 \text{ or } y = \frac{9}{-3} = -3$	<p>✓ $x = 2y + 3$</p> <p>✓ substitution</p> <p>✓ standard form</p> <p>✓ y-values</p> <p>✓ x-values (5)</p> <p>OR/OF</p> <p>✓ $y = \frac{x - 3}{2}$</p> <p>✓ substitution</p> <p>✓ standard form</p> <p>✓ x-values</p> <p>✓ y-values (5)</p> <p>OR/OF</p> <p>✓ $y = \frac{9}{x}$</p> <p>✓ substitution</p> <p>✓ standard form</p> <p>✓ x-values</p> <p>✓ y-values (5)</p>
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1.4	$x^2 + 2xy + 2y^2$ $= x^2 + 2xy + y^2 + y^2$ $= (x + y)^2 + y^2$ $(x + y)^2 \geq 0 \text{ and } y^2 \geq 0$ $\text{Therefore } (x + y)^2 + y^2 \geq 0$	$\checkmark x^2 + 2xy + y^2 + y^2$ $\checkmark (x + y)^2$ $\checkmark (x + y)^2 \geq 0 \text{ and } y^2 \geq 0$ $\checkmark (x + y)^2 + y^2 \geq 0$ <p style="text-align: right;">(4) [27]</p>
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QUESTION/VRAAG 2

<p>2.1.1</p>	<p>37; 50</p>	<p>✓ 37 ✓ 50 (2)</p>
<p>2.1.2</p>	$a = \frac{\text{second difference}}{2} = \frac{2}{2} = 1$ $3a + b = 5$ $3 + b = 5$ $b = 2$ $a + b + c = 5$ $1 + 2 + c = 5$ $c = 2$ $T_n = an^2 + bn + c$ $= n^2 + 2n + 2$	<p>✓ second difference of 2 ✓ $a = 1$ ✓ $b = 2$ ✓ $c = 2$ (4)</p>
<p>2.1.3</p>	$n^2 + 2n + 2 = 1765$ $n^2 + 2n - 1763 = 0$ $(n + 43)(n - 41) = 0$ $n = -43 \text{ or } n = 41$ <p>N/A</p> <p>OR/OF</p> $n^2 + 2n + 2 = 1765$ $n^2 + 2n - 1763 = 0$ $n = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $= \frac{-2 \pm \sqrt{2^2 - 4(1)(-1763)}}{2(1)}$ $= \frac{-2 \pm \sqrt{7056}}{2}$ $n = -43 \text{ or } n = 4$ <p>N/A</p>	<p>✓ equating T_n to 1765 ✓ standard form ✓ factors ✓ answer with rejection (4)</p> <p>OR/OF</p> <p>✓ equating T_n to 1765 ✓ standard form ✓ subt in correct formula ✓ answer with rejection (4)</p>

2.2	<p>Sum of multiples of 7 from 35 to 196: <i>Som van meervoude van 7 vanaf 35 tot by 196:</i> $a = 35; d = 7$ $S_n = \frac{n}{2}[a + \ell]$ $= \frac{24}{2}[35 + 196]$ $= 12[231]$ $= 2772$</p> <p>Sum of all natural numbers from 35 to 196: <i>Som van alle natuurlike getalle vanaf 35 tot by 196:</i> $a = 35; d = 1; n = 162$ $S_n = \frac{n}{2}[a + \ell]$ $= \frac{162}{2}[35 + 196]$ $= 81[231]$ $= 18\ 711$</p> <p>Sum of numbers not divisible by 7/ <i>Som van getalle nie deelbaar deur 7</i> $= 18\ 711 - 2772$ $= 15\ 939$</p>	<p>✓ correct a, d and n substitution into correct formula</p> <p>✓ answer</p> <p>✓ 162</p> <p>✓ answer</p> <p>✓ answer (5) [15]</p>
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QUESTION/VRAAG 3

3.1	$r = 0,94; a = 100$ $T_3 = ar^2$ $= 100(0,94)^2$ $= 88,36 \text{ km}$	✓ $r = 0,94$ ✓ answer (2)
3.2	$S_n = \frac{a(r^n - 1)}{r - 1}$ $750 = \frac{100(0,94^n - 1)}{0,94 - 1}$ $\frac{750(-0,06)}{100} = 0,94^n - 1$ $0,94^n = 1 - \frac{9}{20} \quad \text{or} \quad \left(\frac{47}{50}\right)^n = \frac{11}{20}$ $0,94^n = 0,55$ $n = \frac{\log 0,55}{\log 0,94}$ $= 9,66$ <p>He will pass the halfway point on the 10th day <i>Hy sal die halfpadmerk verbysteeek op die 10^{de} dag</i></p>	✓ substitution into correct formula ✓ $0,94^n = 0,55$ ✓ use of logarithms ✓ answer (4)
3.3	$S_\infty = \frac{a}{1 - r}$ $1500 < \frac{100}{1 - r}$ $1 - r < \frac{100}{1500}$ $r > \frac{14}{15} \text{ or } 93,33\%$	✓ use of S_∞ formula ✓ substitution ✓ answer (3) [9]

QUESTION/VRAAG 4

4.1	$0 < x \leq 1$ or $(0; 1]$	✓✓ answer (2)
4.2	$p = \log_4 \frac{16}{3}$ $\left(\frac{4}{3}\right)^p = \frac{16}{9}$ $\left(\frac{4}{3}\right)^p = \left(\frac{4}{3}\right)^2$ $p = 2$	✓ substitution ✓ $\left(\frac{4}{3}\right)^2$ ✓ answer (3)
4.3	$f : y = \log_{\frac{4}{3}} x$ $f^{-1} : x = \log_{\frac{4}{3}} y$ $y = \left(\frac{4}{3}\right)^x$	✓ $x = \log_{\frac{4}{3}} y$ ✓ $y = \left(\frac{4}{3}\right)^x$ (2)
4.4	$y > 0$ or $y \in (0; \infty)$	✓✓ answer (2)
4.5	$\left(-2; \frac{16}{9}\right)$	✓ -2 ✓ $\frac{16}{9}$ (2) [11]

QUESTION/VRAAG 5

5.1	$x \in R; x \neq -1$	$\checkmark x \in R$ $\checkmark x \neq -1$ (2)
5.2	x -intercept of f : $0 = \frac{2}{x+1} + 4$ $\frac{2}{x+1} = -4$ $2 = -4x - 4$ $4x = -6$ $x = -\frac{3}{2}$	\checkmark equating to 0 \checkmark answer (2)
5.3	$y = \frac{2}{x+1} + 4$ $\frac{14}{3} = \frac{2}{k+1} + 4$ $\frac{2}{k+1} = \frac{14}{3} - 4$ $\frac{2}{k+1} = \frac{2}{3}$ $2k + 2 = 6$ $k + 1 = 3$ $k = 2$	\checkmark substitution \checkmark simplification \checkmark answer (3)
5.4	$C(2;4)$	$\checkmark 2$ $\checkmark 4$ (2)
5.5	$y = a(x+p)^2 + q$ $= a(x-2)^2 + 4$ Substitute $(0; 0)$: $0 = a(0-2)^2 + 4$ $0 = 4a + 4$ $a = -1$ $y = -(x-2)^2 + 4$	$\checkmark a(x-2)^2 + 4$ \checkmark Substitute $(0; 0)$ $\checkmark a = -1$ (3)
5.6	$x \leq -\frac{3}{2}$ or $-1 < x < 0$ or $x > 4$	$\checkmark x \leq -\frac{3}{2}$ $\checkmark -1 < x < 0$ $\checkmark x > 4$ (4)

5.7	<p>$\frac{2}{x} - 5$: f shifted 1 unit to the right and 9 units down. <i>f is 1 eenheid na regs en 9 eenhede afgeskuif.</i></p> <p>$-(x-3)^2 - 5$: g shifted 1 unit to the right and 9 units down. <i>g is 1 eenheid na regs en 9 eenhede afgeskuif.</i></p> <p>Therefore the shift of both graphs took place relative to each other/<i>Dus het die skuif van die grafieke relatief tot mekaar plaasgevind.</i></p> <p>They only intersect in the third quadrant. <i>Hulle sny mekaar slegs in die derde kwadrant.</i></p> <p>Therefore there is only one point of intersection. <i>Daar is dus slegs een snypunt.</i></p>	<p>✓ both shifted 1 unit to the right</p> <p>✓ both shifted 9 units down</p> <p>✓ relative shift</p> <p>✓ one real root</p> <p style="text-align: right;">(4) [20]</p>
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QUESTION/VRAAG 6

6.1	$A = P(1 - i)^n$ $0,5P = P(1 - 0,15)^n$ $(1 - 0,15)^n = 0,5$ $(0,85)^n = 0,5$ $n = \frac{\log 0,5}{\log 0,85} \text{ or } \log_{0,85} 0,5$ $= 4,27 \text{ years}$	<ul style="list-style-type: none"> ✓ A = 0,5P ✓ substitution into correct formula ✓ use of logs ✓ answer <p style="text-align: right;">(4)</p>
6.2	<p>In account one month before his 55th birthday: <i>In rekening een maand voor sy 55^{ste} verjaardag:</i></p> $F = \frac{x[(1+i)^n - 1]}{i}$ $= \frac{1500 \left[\left(1 + \frac{0,092}{12}\right)^{384} - 1 \right]}{\frac{0,092}{12}}$ $= 3478620,49$ <p>In account on his 55th birthday: <i>In rekening op sy 55^{ste} verjaardag:</i></p> $A = P(1+i)^n$ $= 3478620,49 \left(1 + \frac{0,092}{12}\right)^1$ $= R3505289,91$ <p>OR/OF</p> $F = \frac{x(1+i)[(1+i)^n - 1]}{i}$ $= \frac{1500 \left(1 + \frac{0,092}{12}\right) \left[\left(1 + \frac{0,092}{12}\right)^{384} - 1 \right]}{\frac{0,092}{12}}$ $= R3505289,91$	<ul style="list-style-type: none"> ✓ value of i ✓ value of n ✓ substitution into correct formula ✓ adding last month's interest ✓ answer <p style="text-align: right;">(5)</p> <p>OR/OF</p> <ul style="list-style-type: none"> ✓ value of i ✓ value of n ✓ substitution into correct formula ✓ adding last month's interest ✓ answer <p style="text-align: right;">(5)</p>

<p>6.3</p> <p>Invest R<i>x</i> in account A paying 8,4% p.a. compounded quarterly./<i>Belê R<i>x</i> in rekening A wat 8,4% p.a rente betaal, kwartaalliks saamgestel.</i></p> $A = P(1+i)^n$ $= x\left(1 + \frac{0,084}{4}\right)^{48}$ $= 2,711662406x$ <p>Invest (R150 000 – <i>x</i>) in Account B paying 9,6% compounded monthly./<i>Belê (R150 000 – x in rekening A wat 9,6% p.a rente betaal, maandeliks saamgestel.</i></p> <p>After 12 years, the amounts are equal:</p> $x\left(1 + \frac{0,084}{4}\right)^{48} = (150\,000 - x)\left(1 + \frac{0,096}{12}\right)^{144}$ $2,711662406x = 3,150044027(150\,000 - x)$ $2,711662406x = 472506,6041 - 3,150044027x$ $5,861706433x = 472506,6041$ $x = R80\,609,05$ <p>Invest R80 609 in Account A and R150 000 – R80 609,05 = R69 390,95 in Account B</p> <p>OR/OF <i>a = amount invested at 8,4% p.a. compounded quarterly bedrag belê teen 8,4% p.a. kwartaalliks saamgestel</i> <i>b = amount invested at 9,6% p.a. compounded monthly bedrag belê teen 9,6% p.a. maandeliks saamgestel</i></p> $a + b = 150\,000$ $a = 150\,000 - b$ $(150\,000 - b)\left(1 + \frac{0,084}{4}\right)^{48} = b\left(1 + \frac{0,096}{12}\right)^{144}$ $150\,000\left(1 + \frac{0,084}{4}\right)^{48} = b\left[\left(1 + \frac{0,096}{12}\right)^{144} + \left(1 + \frac{0,084}{4}\right)^{48}\right]$ $b = R69\,390,95$ $a = R80\,609,05$	$\checkmark \left(1 + \frac{0,084}{4}\right)^{48}$ $\checkmark \checkmark$ $(150\,000 - x)\left(1 + \frac{0,096}{12}\right)^{144}$ $\checkmark \text{ equation}$ $\checkmark R80\,609,05$ $\checkmark R69\,390,95$ <p style="text-align: right;">(6)</p> <p>OR/OF</p> $\checkmark \left(1 + \frac{0,096}{12}\right)^{144}$ $\checkmark \checkmark (150\,000 - b)\left(1 + \frac{0,084}{4}\right)^{48}$ $\checkmark \text{ equation}$ $\checkmark b$ $\checkmark a$ <p style="text-align: right;">(6)</p> <p style="text-align: right;">[15]</p>
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QUESTION/VRAAG 7**Penalize 1 mark for incorrect notation in the whole question.**

7.1	$f(x+h) = 2 - 3(x+h)^2$ $= 2 - 3(x^2 + 2xh + h^2)$ $= 2 - 3x^2 - 6xh - 3h^2$ $f(x+h) - f(x) = 2 - 3x^2 - 6xh - 3h^2 - (2 - 3x^2)$ $= -6xh - 3h^2$ $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{-6xh - 3h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-6x - 3h)}{h}$ $= \lim_{h \rightarrow 0} (-6x - 3h)$ $= -6x$ <p>OR/OF</p> $f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$ $= \lim_{h \rightarrow 0} \frac{2 - 3(x+h)^2 - (2 - 3x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{2 - 3x^2 - 6xh - 3h^2 - (2 - 3x^2)}{h}$ $= \lim_{h \rightarrow 0} \frac{-6xh - 3h^2}{h}$ $= \lim_{h \rightarrow 0} \frac{h(-6x - 3h)}{h}$ $= \lim_{h \rightarrow 0} (-6x - 3h)$ $= -6x$	$\checkmark 2 - 3x^2 - 6xh - 3h^2$ $\checkmark -6xh - 3h^2$ \checkmark subst. into formula \checkmark factorisation \checkmark answer (5) OR/OF \checkmark subst. into formula \checkmark simplification $\checkmark -6xh - 3h^2$ \checkmark common factor \checkmark answer (5)
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7.2.1	$D_x [(4x + 5)^2]$ $= D_x (16x^2 + 40x + 25)$ $= 32x + 40$	$\checkmark 16x^2 + 40x + 25$ $\checkmark 32x$ $\checkmark + 40$ <p style="text-align: right;">(3)</p>
7.2.2	$y = \sqrt[4]{x} + \frac{x^2 - 8}{x^2}$ $y = x^{\frac{1}{4}} + 1 - 8x^{-2}$ $\frac{dy}{dx} = \frac{1}{4}x^{-\frac{3}{4}} + 16x^{-3}$	$\checkmark x^{\frac{1}{4}}$ $\checkmark 1 - 8x^{-2}$ $\checkmark \frac{1}{4}x^{-\frac{3}{4}}$ $\checkmark 16x^{-3}$ <p style="text-align: right;">(4) [12]</p>

QUESTION/VRAAG 8

8.1	C(0;12)	✓ C(0;12) (1)
8.2	$-x^3 + 13x + 12 = 0$ $x^3 - 13x - 12 = 0$ $(x+1)(x^2 - x - 12) = 0$ $(x+1)(x-4)(x+3) = 0$ A(-3;0) B(4;0)	✓ $f(x) = 0$ ✓ $(x+1)$ ✓ $(x^2 - x - 12)$ ✓ $x = -3$ or 4 ✓ clearly indicating A and B (5)
8.3	$f'(x) = -3x^2 + 13$ $f''(x) = -6x$ $-6x = 0$ $x = 0$ For $f(x)$, point of inflection will be at (0 ; 12). <i>Vir $f(x)$, sal buigpunt wees by (0 ; 12)</i> For $g(x)$, point of inflection will be at (0 ; -12). <i>Vir $g(x)$, sal buigpunt wees by (0 ; -12).</i> OR/OF $g(x) = x^3 - 13x - 12$ $g'(x) = 3x^2 - 13$ $g''(x) = 6x$ $6x = 0$ $x = 0$ (0; -12) OR/OF $f'(x) = -3x^2 + 13$ TP's where $-3x^2 + 13 = 0$ $x^2 = \frac{13}{3}$ $x = \pm\sqrt{\frac{13}{3}}$ $= \pm 2,08$ x-value of point of inflection: $\frac{-2,08 + 2,08}{2} = 0$ For $f(x)$, point of inflection will be at (0 ; 12). <i>Vir $f(x)$, sal buigpunt wees by (0 ; 12)</i> For $g(x)$, point of inflection will be at (0 ; -12). <i>Vir $g(x)$, sal buigpunt wees by (0 ; -12).</i>	✓ $f'(x) = -3x^2 + 13$ ✓ $f''(x) = -6x$ ✓ equating to zero ✓ (0; -12) (4) OR/OR ✓ $g'(x) = 3x^2 - 13$ ✓ $g''(x) = 6x$ ✓ equating to zero ✓ (0; -12) (4) OR/OF ✓ $f'(x) = -3x^2 + 13$ ✓ $-3x^2 + 13 = 0$ ✓ x-values of TP's ✓ (0; -12) (4)

8.4	$f'(x) = -3x^2 + 13$ $-3x^2 + 13 = -14$ $-3x^2 = -27$ $x^2 = 9$ $x = 3 \text{ or } x = -3$	✓ equating derivative to -14 ✓ simplification ✓✓ answers (4) [14]
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QUESTION/VRAAG 9

9.1.1	$AC = t - 30$	✓ answer (1)
9.1.2	$30^2 = (t - 30)^2 + p^2$ [Pythagoras] $p^2 = 900 - (t - 30)^2$ $p^2 = 900 - (t^2 - 60t + 900)$ $p^2 = 900 - t^2 + 60t - 900$ $p^2 = 60t - t^2$	✓ $p^2 = 900 - (t - 30)^2$ ✓ $(t^2 - 60t + 900)$ ✓ $p^2 = 60t - t^2$ (3)
9.2	$V(t) = \frac{1}{3} \pi r^2 t$ $= \frac{1}{3} \pi (60t - t^2) t$ $= 20\pi t^2 - \frac{1}{3} \pi t^3$	✓ substitution (1)
9.3	$V(t) = 20\pi t^2 - \frac{1}{3} \pi t^3$ $V'(t) = 40\pi t - \pi t^2$ $40\pi t - \pi t^2 = 0$ $t(40\pi - t\pi) = 0$ $t = 0$ OR $t = 40$ cm N/A	✓ $40\pi t$ ✓ $-\pi t^2$ ✓ answer with selection (3)
9.4	Volume of cone/keël $= 20(\pi)(40)^2 - \frac{1}{3} \pi (40)^3$ $= 10\,666,67\pi$ or $33510,33211$ Volume of sphere/sfeer $= \frac{4}{3} \pi r^3$ $= \frac{4}{3} \pi (30)^3$ $= 36000\pi$ or $113097,3355$ $\frac{10666,67\pi}{36000\pi}$ $= 0,296296$ $\approx 29,63\%$	✓ volume of cone ✓ volume of sphere ✓ $\frac{10666,67\pi}{36000\pi}$ ✓ % cut out (4) [12]

QUESTION/VRAAG 10

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

QUESTION/VRAAG 11

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

TOTAL/TOTAAL: 150