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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:

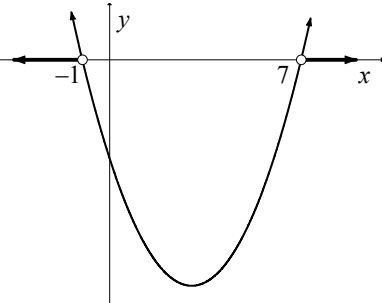
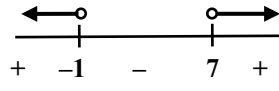
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- Consistent accuracy applies in ALL aspects of the marking guidelines.

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

| | | |
|-------|--|--|
| 1.1.4 | $(x-1)(x-4) > x+11$ $x^2 - 5x + 4 > x + 11$ $x^2 - 6x - 7 > 0$ $(x-7)(x+1) > 0$  OR  $x < -1 \text{ or } x > 7$ | $\checkmark x^2 - 5x + 4$ \checkmark standard form \checkmark factors $\checkmark\checkmark x < -1 \text{ or } x > 7$ (5) |
| 1.2 | $\frac{4\sqrt{x^7} - 5\sqrt{x^7}}{\sqrt{x}}$ $= \frac{-\sqrt{x^7}}{\sqrt{x}}$ $= \frac{-x^{\frac{7}{2}}}{x^{\frac{1}{2}}}$ $= -x^3$ <p>OR/OF</p> $\frac{\sqrt{x^7}(4-5)}{\sqrt{x}}$ $= \sqrt{x^6}(-1)$ $= -x^3$ <p>OR/OF</p> $\frac{(16x^7)^{\frac{1}{2}} - (25x^7)^{\frac{1}{2}}}{x^{\frac{1}{2}}}$ $= \frac{4x^{\frac{7}{2}} - 5x^{\frac{7}{2}}}{x^{\frac{1}{2}}}$ $= \frac{-x^{\frac{7}{2}}}{x^{\frac{1}{2}}}$ $= -x^3$ | $\checkmark 4\sqrt{x^7} - 5\sqrt{x^7}$ $\checkmark -\sqrt{x^7}$ $\checkmark -x^3$ (3) <p>OR/OF</p> $\checkmark \sqrt{x^7}(4-5)$ $\checkmark \sqrt{x^6}(-1)$ $\checkmark -x^3$ (3) <p>OR/OF</p> $\checkmark \frac{4x^{\frac{7}{2}} - 5x^{\frac{7}{2}}}{x^{\frac{1}{2}}}$ $\checkmark -x^{\frac{7}{2}}$ $\checkmark -x^3$ (3) |

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

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

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| 2.2 | <p>Sum of multiples of 7 from 35 to 196: <i>Som van meervoude van 7 vanaf 35 tot by 196:</i> $a = 35; d = 7$ $S_n = \frac{n}{2}[a + \ell]$ $= \frac{24}{2}[35 + 196]$ $= 12[231]$ $= 2772$ Sum of all natural numbers from 35 to 196: <i>Som van alle natuurlike getalle vanaf 35 tot by 196:</i> $a = 35; d = 1; n = 162$ $S_n = \frac{n}{2}[a + \ell]$ $= \frac{162}{2}[35 + 196]$ $= 81[231]$ $= 18\ 711$ 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> |
|-----|--|---|

QUESTION/VRAAG 3

| | | |
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| 3.1 | $r = 0,94; \quad a = 100$ $T_3 = ar^2$ $= 100(0,94)^2$ $= 88,36 \text{ km}$ | ✓ $r = 0,94$ ✓ 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 verbystee op die 10^{de} dag</i></p> | ✓ substitution into correct formula ✓ $0,94^n = 0,55$ ✓ use of logarithms ✓ answer (4) |
| 3.3 | $S_\infty = \frac{a}{1 - r}$ $1500 < \frac{100}{1 - r}$ $1 - r < \frac{100}{1500}$ $r > \frac{14}{15} \quad \text{or} \quad 93,33\%$ | ✓ use of S_∞ formula ✓ substitution ✓ answer (3) |

[9]

QUESTION/VRAAG 4

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| 4.1 | $0 < x \leq 1$ or $(0 ; 1]$ | ✓✓ answer (2) |
| 4.2 | $p = \log_{\frac{4}{3}} \frac{16}{9}$ $\left(\frac{4}{3}\right)^p = \frac{16}{9}$ $\left(\frac{4}{3}\right)^p = \left(\frac{4}{3}\right)^2$ $p = 2$ | ✓ 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

| | | |
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| 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) |

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| 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>(4) [20]</p> |
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QUESTION/VRAAG 6

| | | |
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| 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 |
| 6.2 | <p>In account one month before his 55th birthday: <i>In rekening een maand voor sy 55^{ste} verjaardag:</i></p> $F = \frac{x[(1+i)^n - 1]}{i}$ $= \frac{1500 \left[\left(1 + \frac{0,092}{12} \right)^{384} - 1 \right]}{\frac{0,092}{12}}$ $= 3\,478\,620,49$ <p>In account on his 55th birthday: <i>In rekening op sy 55^{ste} verjaardag:</i></p> $A = P(1+i)^n$ $= 3\,478\,620,49 \left(1 + \frac{0,092}{12} \right)^1$ $= R3\,505\,289,91$ <p>OR/OF</p> $F = \frac{x(1+i)[(1+i)^n - 1]}{i}$ $= \frac{1500 \left(1 + \frac{0,092}{12} \right) \left[\left(1 + \frac{0,092}{12} \right)^{384} - 1 \right]}{\frac{0,092}{12}}$ $= R3\,505\,289,91$ | <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> |

| | | |
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| 6.3 | <p>Invest Rx in account A paying 8,4% p.a. compounded quarterly./<i>Belê Rx 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 – x) 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> $x \left(1 + \frac{0,084}{4}\right)^{48} = (150\,000 - x) \left(1 + \frac{0,096}{12}\right)^{144}$ $2,711662406x = 3,150044027(150\,000 - x)$ $2,711662406x = 472\,506,6041 - 3,150044027x$ $5,861706433x = 472\,506,6041$ $x = R80\,609,05$ <p>Invest R80 609 in Account A and R150 000 – R80 609,05 = R69 390,95 in Account B</p> <p>OR/OF a = amount invested at 8,4% p.a. compounded quarterly <i>bedrag belê teen 8,4% p.a. kwartaalliks saamgestel</i> b = amount invested at 9,6% p.a. compounded monthly <i>bedrag belê teen 9,6% p.a. maandeliks saamgestel</i></p> $a + b = 150\,000$ $a = 150\,000 - b$ $(150\,000 - b) \left(1 + \frac{0,084}{4}\right)^{48} = b \left(1 + \frac{0,096}{12}\right)^{144}$ $150\,000 \left(1 + \frac{0,084}{4}\right)^{48} = b \left[\left(1 + \frac{0,096}{12}\right)^{144} + \left(1 + \frac{0,084}{4}\right)^{48} \right]$ $b = R69\,390,95$ $a = R80\,609,05$ | $\checkmark \left(1 + \frac{0,084}{4}\right)^{48}$ <p>✓✓</p> $(150\,000 - x) \left(1 + \frac{0,096}{12}\right)^{144}$ <p>✓ equation</p> <p>✓ R80 609,05</p> <p>✓ R69 390,95</p> <p>(6)</p> <p>OR/OF</p> $\checkmark \left(1 + \frac{0,096}{12}\right)^{144}$ $\checkmark \checkmark (150\,000 - b) \left(1 + \frac{0,084}{4}\right)^{48}$ <p>✓ equation</p> <p>✓ b</p> <p>✓ a</p> <p>(6)</p> <p>[15]</p> |
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QUESTION/VRAAG 7**Penalize 1 mark for incorrect notation in the whole question.**

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| 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 | $D_x[(4x+5)^2]$ $= D_x(16x^2 + 40x + 25)$ $= 32x + 40$ | $\checkmark 16x^2 + 40x + 25$ $\checkmark 32x$ $\checkmark + 40$ |
| 7.2.2 | $y = \sqrt[4]{x} + \frac{x^2 - 8}{x^2}$ $y = x^{\frac{1}{4}} + 1 - 8x^{-2}$ $\frac{dy}{dx} = \frac{1}{4}x^{-\frac{3}{4}} + 16x^{-3}$ | $\checkmark x^{\frac{1}{4}}$ $\checkmark 1 - 8x^{-2}$ $\checkmark \frac{1}{4}x^{-\frac{3}{4}}$ $\checkmark 16x^{-3}$ |
| | | (3) |
| | | (4) |
| | | [12] |

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) OF/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) |

| | | |
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| 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] |
|-----|--|--|

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 | $V(t) = 20\pi t^2 - \frac{1}{3} \pi t^3$ $V'(t) = 40\pi t - \pi t^2$ $40\pi t - \pi t^2 = 0$ $t(40\pi - \pi t) = 0$ $t = 0$ 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 | $10!$ $= 3\,628\,800$ | ✓ $10!$ ✓ 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