

Q 1+10
Q 2+3
Q 4+11
Q 5+6
Q 7, 8, 9



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**NATIONAL
SENIOR CERTIFICATE/
NASIONALE SENIOR
SERTIFIKAAT**

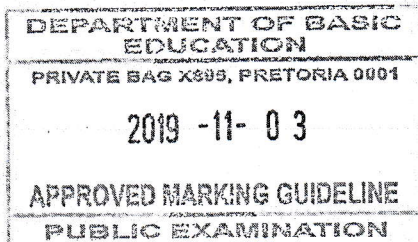
GRADE 12/GRAAD 12

MATHEMATICS P1/WISKUNDE VI

NOVEMBER 2019

MARKING GUIDELINES/NASIENRIGLYNE

MARKS/PUNTE: 150



McCasman
(UMALUSI)
03 - 11 - 2019
Approved

These marking guidelines consist of 18 pages.
Hierdie nasienriglyne bestaan uit 18 bladsye.

Approved
Phoe
2019-11-03

Key from question paper
 X correct c/s after that
 NOTE:

$$(x-6)(x+1) = 0 \quad X$$

$$x = -6 \text{ or } x = 1 \quad X \quad \left(\frac{0}{3}\right)$$

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

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

$x = -6 \text{ or } x = 1$ full marks
 $(x-6)(x+1)$

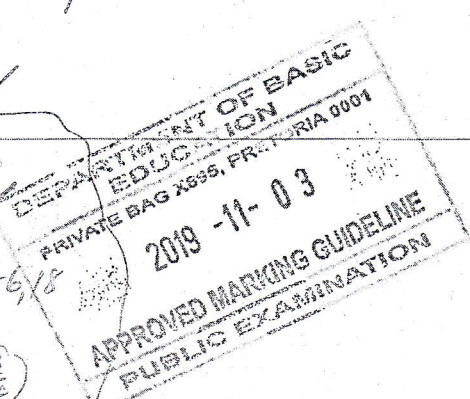
<p>1.1.1</p>	$x^2 + 5x - 6 = 0$ $(x+6)(x-1) = 0$ $x = -6 \text{ or } x = 1$	<p>Answers ONLY full marks $\left(\frac{3}{3}\right)$ CA applies</p>	<p>correct cube into correct formula Wrong factors correct answer $\left(\frac{0}{3}\right)$</p>
<p>1.1.2</p>	$4x^2 + 3x - 5 = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$ $x = \frac{-3 \pm \sqrt{(3)^2 - 4(4)(-5)}}{2(4)}$ $x = \frac{-3 \pm \sqrt{89}}{8}$ $x = -1,55 \text{ or } x = 0,8$	<p>NO FACTORS BD Answer only full marks Penalty for rounding</p>	<p>Wrong formula BD substitution into the correct formula $x = 1,55 \text{ or } x = 0,8$ $x = -1,55 \text{ or } x = 0,8$ $x = 1,55 \text{ or } x = 0,8$</p>
<p>1.1.3</p>	$4x^2 - 1 < 0$ $(2x+1)(2x-1) < 0$ $-\frac{1}{2} < x < \frac{1}{2}$	<p>or CV^{NS} $-\frac{1}{2} \quad \frac{1}{2}$ ✓ factors ✓ method ✓ answer (depends on method) (3)</p>	<p>$-\frac{1}{2} < x < \frac{1}{2}$ graph</p>
<p>1.1.4</p>	$(\sqrt{32+x})(\sqrt{32-x}) = x$ $\sqrt{32-x^2} = x$ $32-x^2 = x^2$ $-2x^2 = -32$ $x^2 = 16$ $x = \pm 4$ $\therefore x = 4$	<p>Answers ONLY full marks $\frac{4}{4}$</p> <p>✓ $\sqrt{32-x^2}$ ✓ squaring both sides ✓ $x^2 = 16$ ✓ $x = 4$ (selection) (4)</p>	<p>NE $(\frac{1}{2}, -\frac{1}{2})$ NE $(-\frac{1}{2}, \frac{1}{2})$ $\left(\frac{3}{3}\right)$</p>

Wrong formula $\left(\frac{0}{3}\right)$

BD
 Subst
 $\frac{3 \pm \sqrt{89}}{8}$
 No solution ✓

Answer ONLY
 full marks
 $c > -\frac{1}{2}$ and $x < \frac{1}{2}$

$32 - x^2 = x$
 $x^2 + x - 32 = 0$
 $x = 5,18 \text{ or } x = -6,18$
 No solution
 $\left(\frac{3}{4}\right)$



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6448

if equations
are substituted
comes
over = $\frac{2}{5}$

CA applies

<p>1.2</p> <p>$y + x = 12$</p> <p>$y = -x + 12 \dots\dots\dots(1)$ ✓</p> <p>$xy = 14 - 3x \dots\dots\dots(2)$</p> <p>Sub (1) into (2)</p> <p>$x(-x + 12) = 14 - 3x$ ✓</p> <p>$-x^2 + 12x - 14 + 3x = 0$</p> <p>$-x^2 + 15x - 14 = 0$ } ✓ any</p> <p>$x^2 - 15x + 14 = 0$</p> <p>$(x - 14)(x - 1) = 0$</p> <p>$x = 14$ or $x = 1$ ✓ (both)</p> <p>$y = -2$ or $y = 11$ ✓ (both)</p> <p>OR/OF</p> <p>$y + x = 12$</p> <p>$x = -y + 12 \dots\dots\dots(1)$ ✓</p> <p>$xy = 14 - 3x \dots\dots\dots(2)$</p> <p>Sub (1) into (2)</p> <p>$y(-y + 12) = 14 - 3(-y + 12)$ ✓</p> <p>$12y - y^2 - 14 + 36 - 3y = 0$</p> <p>$-y^2 + 9y + 22 = 0$</p> <p>$y^2 - 9y - 22 = 0$</p> <p>$(y + 2)(y - 11) = 0$</p> <p>$y = -2$ or $y = 11$ ✓</p> <p>$x = 14$ or $x = 1$ ✓</p> <p>But if $y + x = 12$</p>	<p>$y + x = 12$</p> <p>$y = -x + 12 \dots\dots\dots(1)$ ✓</p> <p>$xy = 14 - 3x \dots\dots\dots(2)$</p> <p>Sub (1) into (2)</p> <p>$x(-x + 12) = 14 - 3x$ ✓</p> <p>$-x^2 + 12x - 14 + 3x = 0$</p> <p>$-x^2 + 15x - 14 = 0$</p> <p>$x^2 - 15x + 14 = 0$</p> <p>$(x - 14)(x - 1) = 0$</p> <p>$x = 14$ or $x = 1$ ✓ (both)</p> <p>$y = -2$ or $y = 11$ ✓ (both)</p> <p>OR/OF</p> <p>$y + x = 12$</p> <p>$x = -y + 12 \dots\dots\dots(1)$ ✓</p> <p>$xy = 14 - 3x \dots\dots\dots(2)$</p> <p>Sub (1) into (2)</p> <p>$y(-y + 12) = 14 - 3(-y + 12)$ ✓</p> <p>$12y - y^2 - 14 + 36 - 3y = 0$</p> <p>$-y^2 + 9y + 22 = 0$</p> <p>$y^2 - 9y - 22 = 0$</p> <p>$(y + 2)(y - 11) = 0$</p> <p>$y = -2$ or $y = 11$ ✓</p> <p>$x = 14$ or $x = 1$ ✓</p> <p>if $x = -2$ or $x = 11$ ✓ check y-values $y = 14$ or $y = 1$ ✓ (both)</p>	<p>✓ y subject of the formula</p> <p>✓ substitution</p> <p>✓ simplification</p> <p>✓ both values of x</p> <p>✓ both values of y (5)</p> <p>OR/OF</p> <p>✓ x subject of the formula</p> <p>✓ substitution</p> <p>✓ simplification</p> <p>✓ both values of y</p> <p>✓ both values of x (5)</p>
<p>1.3</p> <p>3 6 9 12 15 18 21 24 27 30 ✓</p> <p>3 3 3² 3 3 3² 3 3 3³ 3 ✓</p> <p>∴ k = 14 ✓</p>	<p>3 6 9 12 15 18 21 24 27 30 ✓</p> <p>3 3 3² 3 3 3² 3 3 3³ 3 ✓</p> <p>∴ k = 14 ✓</p> <p>Answers ONLY full marks</p>	<p>✓ identifying multiples of 3 (any 3)</p> <p>✓ ten multiples of 3</p> <p>✓ powers of 3</p> <p>✓ answer (4)</p>

$x = 12 - y$
 $= 12 - (-2)$
 $= 14$ ✓

DEPARTMENT OF BASIC EDUCATION
PRIVATE BAG X895, PRETORIA 0001

2019 -11- 03

APPROVED MARKING GUIDELINE
PUBLIC EXAMINATION

MS

⊕

⊕

[22]

QUESTION/VRAAG 2

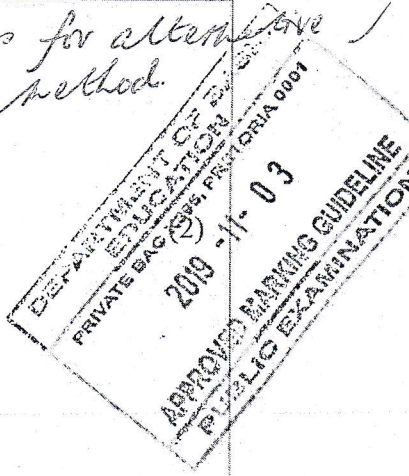
order NOT important
Accuracy

2.1.1	209 ; 186	✓209 ✓186 (2)
2.1.2	$ \begin{array}{cccc} 321 & ; & 290 & ; & 261 & ; & 234 \\ & \swarrow & & \swarrow & & \swarrow & \\ 1st\ diff & & -31 & & -29 & & -27 \\ & & \swarrow & & \swarrow & & \\ 2nd\ diff & & & & 2 & & 2\checkmark \\ \\ 2a = 2 & & 3a + b = -31 & & a + b + c = 321 \\ a = 1\checkmark & & 3(1) + b = -31 & & 1 + (-34) + c = 321 \\ & & b = -34\checkmark & & c = 354\checkmark \\ \\ T_n = n^2 - 34n + 354 \end{array} $	<p><i>Answer ONLY</i> <i>full marks</i></p> <p>✓ 2nd diff = 2 <i>CA applies</i></p> <p>✓ a = 1 ✓ b = -34 ✓ c = 354</p> <p>(4)</p>
2.1.3	$ \begin{array}{l} n^2 - 34n + 354 = 74\checkmark \\ n^2 - 34n + 280 = 0\checkmark \\ (n-14)(n-20) = 0 \\ n = 14\checkmark \text{ or } n = 20\checkmark \end{array} $	<p><i>CA from 2.1.2.</i></p> <p>✓ equating T_n to 74</p> <p>✓ standard form <i>for 2.1.2 (quadratic)</i></p> <p><i>If learner gets decimals, the conclusion (n=13,3 / n=19,4) must be correct. (4th mark)</i></p> <p><i>Wroeg faktor → see notes.</i></p> <p>✓14 ✓20 (4)</p>
2.1.4	$ \begin{array}{l} f'(n) = 0 \\ 2n - 34 = 0\checkmark \\ 2n = 34 \\ n = 17 \\ \\ \text{Term 17 will have the smallest value} \\ \\ \text{OR/OF} \\ \\ n = \frac{-b}{2a} \\ n = \frac{34}{2}\checkmark \\ n = 17\checkmark \\ \\ \text{Term 17 will have the smallest value} \\ \\ \text{OR/OF} \\ \\ n = \frac{14 + 20}{2} = 17\checkmark \\ \\ \text{Term 17 will have the smallest value} \end{array} $	<p><i>See notes for alternative method.</i></p> <p>✓ $2n - 34 = 0$</p> <p>✓ answer</p> <p>OR/OF</p> <p>✓ substitution</p> <p>✓ answer (2)</p> <p>OR/OF</p> <p>✓ substitution</p> <p>✓ answer (2)</p>

id mark in tape, BD
2e = -2x
2 = -1

2 cases only
full marks
How only

Answer ONLY
full marks



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me
Φ

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<p>2.2.1</p>	$a = \frac{5}{8} ; r = \frac{1}{2} ; n = 21$ $S_n = \frac{a(1-r^n)}{1-r}$ $S_{21} = \frac{\frac{5}{8} \left(1 - \left(\frac{1}{2} \right)^{21} \right)}{1 - \frac{1}{2}}$ $= 1,2499\dots$ $= 1,25 \checkmark / 1,24 \text{ N661,3}$	<p>✓ r</p> <p>✓ substitution into the correct formula (GP)</p> <p>✓ answer</p> <p>(3)</p>
<p>2.2.2</p>	<p><i>Answer ONLY</i></p> $T_n > \frac{5}{8192}$ $ar^{n-1} > \frac{5}{8192}$ $\frac{5}{8} \left(\frac{1}{2} \right)^{n-1} > \frac{5}{8192}$ $\left(\frac{1}{2} \right)^{n-1} > \frac{1}{1024}$ $\left(\frac{1}{2} \right)^{n-1} > \left(\frac{1}{2} \right)^{10} \checkmark$ <p>∴ n-1 < 10</p> <p>n < 11</p> <p>∴ n = 10</p> <p><i>irrespective of sign</i></p> <p>OR/OF</p> <p>8 ; 16 ; 32 ; ... ; 8192</p> $8 \cdot 2^{n-1} < 8192$ $2^{n-1} < 1024$ $2^{n-1} < 2^{10} \checkmark$ <p>n-1 < 10</p> <p>n < 11</p> <p>∴ n = 10</p> <p><i>21-11=10</i></p> <p><i>21-10=11</i></p> <p><i>21-12=9</i></p> <p><i>21-13=8</i></p> <p><i>21-14=7</i></p> <p><i>21-15=6</i></p> <p><i>21-16=5</i></p> <p><i>21-17=4</i></p> <p><i>21-18=3</i></p> <p><i>21-19=2</i></p> <p><i>21-20=1</i></p> <p><i>21-21=0</i></p> <p><i>21-22=-1</i></p> <p><i>21-23=-2</i></p> <p><i>21-24=-3</i></p> <p><i>21-25=-4</i></p> <p><i>21-26=-5</i></p> <p><i>21-27=-6</i></p> <p><i>21-28=-7</i></p> <p><i>21-29=-8</i></p> <p><i>21-30=-9</i></p> <p><i>21-31=-10</i></p> <p><i>21-32=-11</i></p> <p><i>21-33=-12</i></p> <p><i>21-34=-13</i></p> <p><i>21-35=-14</i></p> <p><i>21-36=-15</i></p> <p><i>21-37=-16</i></p> <p><i>21-38=-17</i></p> <p><i>21-39=-18</i></p> <p><i>21-40=-19</i></p> <p><i>21-41=-20</i></p> <p><i>21-42=-21</i></p> <p><i>21-43=-22</i></p> <p><i>21-44=-23</i></p> <p><i>21-45=-24</i></p> <p><i>21-46=-25</i></p> <p><i>21-47=-26</i></p> <p><i>21-48=-27</i></p> <p><i>21-49=-28</i></p> <p><i>21-50=-29</i></p> <p><i>21-51=-30</i></p> <p><i>21-52=-31</i></p> <p><i>21-53=-32</i></p> <p><i>21-54=-33</i></p> <p><i>21-55=-34</i></p> <p><i>21-56=-35</i></p> <p><i>21-57=-36</i></p> <p><i>21-58=-37</i></p> <p><i>21-59=-38</i></p> <p><i>21-60=-39</i></p> <p><i>21-61=-40</i></p> <p><i>21-62=-41</i></p> <p><i>21-63=-42</i></p> <p><i>21-64=-43</i></p> <p><i>21-65=-44</i></p> <p><i>21-66=-45</i></p> <p><i>21-67=-46</i></p> <p><i>21-68=-47</i></p> <p><i>21-69=-48</i></p> <p><i>21-70=-49</i></p> <p><i>21-71=-50</i></p> <p><i>21-72=-51</i></p> <p><i>21-73=-52</i></p> <p><i>21-74=-53</i></p> <p><i>21-75=-54</i></p> <p><i>21-76=-55</i></p> <p><i>21-77=-56</i></p> <p><i>21-78=-57</i></p> <p><i>21-79=-58</i></p> <p><i>21-80=-59</i></p> <p><i>21-81=-60</i></p> <p><i>21-82=-61</i></p> <p><i>21-83=-62</i></p> <p><i>21-84=-63</i></p> <p><i>21-85=-64</i></p> <p><i>21-86=-65</i></p> <p><i>21-87=-66</i></p> <p><i>21-88=-67</i></p> <p><i>21-89=-68</i></p> <p><i>21-90=-69</i></p> <p><i>21-91=-70</i></p> <p><i>21-92=-71</i></p> <p><i>21-93=-72</i></p> <p><i>21-94=-73</i></p> <p><i>21-95=-74</i></p> <p><i>21-96=-75</i></p> <p><i>21-97=-76</i></p> <p><i>21-98=-77</i></p> <p><i>21-99=-78</i></p> <p><i>21-100=-79</i></p> <p><i>21-101=-80</i></p> <p><i>21-102=-81</i></p> <p><i>21-103=-82</i></p> <p><i>21-104=-83</i></p> <p><i>21-105=-84</i></p> <p><i>21-106=-85</i></p> <p><i>21-107=-86</i></p> <p><i>21-108=-87</i></p> <p><i>21-109=-88</i></p> <p><i>21-110=-89</i></p> <p><i>21-111=-90</i></p> <p><i>21-112=-91</i></p> <p><i>21-113=-92</i></p> <p><i>21-114=-93</i></p> <p><i>21-115=-94</i></p> <p><i>21-116=-95</i></p> <p><i>21-117=-96</i></p> <p><i>21-118=-97</i></p> <p><i>21-119=-98</i></p> <p><i>21-120=-99</i></p> <p><i>21-121=-100</i></p> <p><i>21-122=-101</i></p> <p><i>21-123=-102</i></p> <p><i>21-124=-103</i></p> <p><i>21-125=-104</i></p> <p><i>21-126=-105</i></p> <p><i>21-127=-106</i></p> <p><i>21-128=-107</i></p> <p><i>21-129=-108</i></p> <p><i>21-130=-109</i></p> <p><i>21-131=-110</i></p> <p><i>21-132=-111</i></p> <p><i>21-133=-112</i></p> <p><i>21-134=-113</i></p> <p><i>21-135=-114</i></p> <p><i>21-136=-115</i></p> <p><i>21-137=-116</i></p> <p><i>21-138=-117</i></p> <p><i>21-139=-118</i></p> <p><i>21-140=-119</i></p> <p><i>21-141=-120</i></p> <p><i>21-142=-121</i></p> <p><i>21-143=-122</i></p> <p><i>21-144=-123</i></p> <p><i>21-145=-124</i></p> <p><i>21-146=-125</i></p> <p><i>21-147=-126</i></p> <p><i>21-148=-127</i></p> <p><i>21-149=-128</i></p> <p><i>21-150=-129</i></p> <p><i>21-151=-130</i></p> <p><i>21-152=-131</i></p> <p><i>21-153=-132</i></p> <p><i>21-154=-133</i></p> <p><i>21-155=-134</i></p> <p><i>21-156=-135</i></p> <p><i>21-157=-136</i></p> <p><i>21-158=-137</i></p> <p><i>21-159=-138</i></p> <p><i>21-160=-139</i></p> <p><i>21-161=-140</i></p> <p><i>21-162=-141</i></p> <p><i>21-163=-142</i></p> <p><i>21-164=-143</i></p> <p><i>21-165=-144</i></p> <p><i>21-166=-145</i></p> <p><i>21-167=-146</i></p> <p><i>21-168=-147</i></p> <p><i>21-169=-148</i></p> <p><i>21-170=-149</i></p> <p><i>21-171=-150</i></p> <p><i>21-172=-151</i></p> <p><i>21-173=-152</i></p> <p><i>21-174=-153</i></p> <p><i>21-175=-154</i></p> <p><i>21-176=-155</i></p> <p><i>21-177=-156</i></p> <p><i>21-178=-157</i></p> <p><i>21-179=-158</i></p> <p><i>21-180=-159</i></p> <p><i>21-181=-160</i></p> <p><i>21-182=-161</i></p> <p><i>21-183=-162</i></p> <p><i>21-184=-163</i></p> <p><i>21-185=-164</i></p> <p><i>21-186=-165</i></p> <p><i>21-187=-166</i></p> <p><i>21-188=-167</i></p> <p><i>21-189=-168</i></p> <p><i>21-190=-169</i></p> <p><i>21-191=-170</i></p> <p><i>21-192=-171</i></p> <p><i>21-193=-172</i></p> <p><i>21-194=-173</i></p> <p><i>21-195=-174</i></p> <p><i>21-196=-175</i></p> <p><i>21-197=-176</i></p> <p><i>21-198=-177</i></p> <p><i>21-199=-178</i></p> <p><i>21-200=-179</i></p> <p><i>21-201=-180</i></p> <p><i>21-202=-181</i></p> <p><i>21-203=-182</i></p> <p><i>21-204=-183</i></p> <p><i>21-205=-184</i></p> <p><i>21-206=-185</i></p> <p><i>21-207=-186</i></p> <p><i>21-208=-187</i></p> <p><i>21-209=-188</i></p> <p><i>21-210=-189</i></p> <p><i>21-211=-190</i></p> <p><i>21-212=-191</i></p> <p><i>21-213=-192</i></p> <p><i>21-214=-193</i></p> <p><i>21-215=-194</i></p> <p><i>21-216=-195</i></p> <p><i>21-217=-196</i></p> <p><i>21-218=-197</i></p> <p><i>21-219=-198</i></p> <p><i>21-220=-199</i></p> <p><i>21-221=-200</i></p> <p><i>21-222=-201</i></p> <p><i>21-223=-202</i></p> <p><i>21-224=-203</i></p> <p><i>21-225=-204</i></p> <p><i>21-226=-205</i></p> <p><i>21-227=-206</i></p> <p><i>21-228=-207</i></p> <p><i>21-229=-208</i></p> <p><i>21-230=-209</i></p> <p><i>21-231=-210</i></p> <p><i>21-232=-211</i></p> <p><i>21-233=-212</i></p> <p><i>21-234=-213</i></p> <p><i>21-235=-214</i></p> <p><i>21-236=-215</i></p> <p><i>21-237=-216</i></p> <p><i>21-238=-217</i></p> <p><i>21-239=-218</i></p> <p><i>21-240=-219</i></p> <p><i>21-241=-220</i></p> <p><i>21-242=-221</i></p> <p><i>21-243=-222</i></p> <p><i>21-244=-223</i></p> <p><i>21-245=-224</i></p> <p><i>21-246=-225</i></p> <p><i>21-247=-226</i></p> <p><i>21-248=-227</i></p> <p><i>21-249=-228</i></p> <p><i>21-250=-229</i></p> <p><i>21-251=-230</i></p> <p><i>21-252=-231</i></p> <p><i>21-253=-232</i></p> <p><i>21-254=-233</i></p> <p><i>21-255=-234</i></p> <p><i>21-256=-235</i></p> <p><i>21-257=-236</i></p> <p><i>21-258=-237</i></p> <p><i>21-259=-238</i></p> <p><i>21-260=-239</i></p> <p><i>21-261=-240</i></p> <p><i>21-262=-241</i></p> <p><i>21-263=-242</i></p> <p><i>21-264=-243</i></p> <p><i>21-265=-244</i></p> <p><i>21-266=-245</i></p> <p><i>21-267=-246</i></p> <p><i>21-268=-247</i></p> <p><i>21-269=-248</i></p> <p><i>21-270=-249</i></p> <p><i>21-271=-250</i></p> <p><i>21-272=-251</i></p> <p><i>21-273=-252</i></p> <p><i>21-274=-253</i></p> <p><i>21-275=-254</i></p> <p><i>21-276=-255</i></p> <p><i>21-277=-256</i></p> <p><i>21-278=-257</i></p> <p><i>21-279=-258</i></p> <p><i>21-280=-259</i></p> <p><i>21-281=-260</i></p> <p><i>21-282=-261</i></p> <p><i>21-283=-262</i></p> <p><i>21-284=-263</i></p> <p><i>21-285=-264</i></p> <p><i>21-286=-265</i></p> <p><i>21-287=-266</i></p> <p><i>21-288=-267</i></p> <p><i>21-289=-268</i></p> <p><i>21-290=-269</i></p> <p><i>21-291=-270</i></p> <p><i>21-292=-271</i></p> <p><i>21-293=-272</i></p> <p><i>21-294=-273</i></p> <p><i>21-295=-274</i></p> <p><i>21-296=-275</i></p> <p><i>21-297=-276</i></p> <p><i>21-298=-277</i></p> <p><i>21-299=-278</i></p> <p><i>21-300=-279</i></p> <p><i>21-301=-280</i></p> <p><i>21-302=-281</i></p> <p><i>21-303=-282</i></p> <p><i>21-304=-283</i></p> <p><i>21-305=-284</i></p> <p><i>21-306=-285</i></p> <p><i>21-307=-286</i></p> <p><i>21-308=-287</i></p> <p><i>21-309=-288</i></p> <p><i>21-310=-289</i></p> <p><i>21-311=-290</i></p> <p><i>21-312=-291</i></p> <p><i>21-313=-292</i></p> <p><i>21-314=-293</i></p> <p><i>21-315=-294</i></p> <p><i>21-316=-295</i></p> <p><i>21-317=-296</i></p> <p><i>21-318=-297</i></p> <p><i>21-319=-298</i></p> <p><i>21-320=-299</i></p> <p><i>21-321=-300</i></p> <p><i>21-322=-301</i></p> <p><i>21-323=-302</i></p> <p><i>21-324=-303</i></p> <p><i>21-325=-304</i></p> <p><i>21-326=-305</i></p> <p><i>21-327=-306</i></p> <p><i>21-328=-307</i></p> <p><i>21-329=-308</i></p> <p><i>21-330=-309</i></p> <p><i>21-331=-310</i></p> <p><i>21-332=-311</i></p> <p><i>21-333=-312</i></p> <p><i>21-334=-313</i></p> <p><i>21-335=-314</i></p> <p><i>21-336=-315</i></p> <p><i>21-337=-316</i></p> <p><i>21-338=-317</i></p> <p><i>21-339=-318</i></p> <p><i>21-340=-319</i></p> <p><i>21-341=-320</i></p> <p><i>21-342=-321</i></p> <p><i>21-343=-322</i></p> <p><i>21-344=-323</i></p> <p><i>21-345=-324</i></p> <p><i>21-346=-325</i></p> <p><i>21-347=-326</i></p> <p><i>21-348=-327</i></p> <p><i>21-349=-328</i></p> <p><i>21-350=-329</i></p> <p><i>21-351=-330</i></p> <p><i>21-352=-331</i></p> <p><i>21-353=-332</i></p> <p><i>21-354=-333</i></p> <p><i>21-355=-334</i></p> <p><i>21-356=-335</i></p> <p><i>21-357=-336</i></p> <p><i>21-358=-337</i></p> <p><i>21-359=-338</i></p> <p><i>21-360=-339</i></p> <p><i>21-361=-340</i></p> <p><i>21-362=-341</i></p> <p><i>21-363=-342</i></p> <p><i>21-364=-343</i></p> <p><i>21-365=-344</i></p> <p><i>21-366=-345</i></p> <p><i>21-367=-346</i></p> <p><i>21-368=-347</i></p> <p><i>21-369=-348</i></p> <p><i>21-370=-349</i></p> <p><i>21-371=-350</i></p> <p><i>21-372=-351</i></p> <p><i>21-373=-352</i></p> <p><i>21-374=-353</i></p> <p><i>21-375=-354</i></p> <p><i>21-376=-355</i></p> <p><i>21-377=-356</i></p> <p><i>21-378=-357</i></p> <p><i>21-379=-358</i></p> <p><i>21-380=-359</i></p> <p><i>21-381=-360</i></p> <p><i>21-382=-361</i></p> <p><i>21-383=-362</i></p> <p><i>21-384=-363</i></p> <p><i>21-385=-364</i></p> <p><i>21-386=-365</i></p> <p><i>21-387=-366</i></p> <p><i>21-388=-367</i></p> <p><i>21-389=-368</i></p> <p><i>21-390=-369</i></p> <p><i>21-391=-370</i></p> <p><i>21-392=-371</i></p> <p><i>21-393=-372</i></p> <p><i>21-394=-373</i></p> <p><i>21-395=-374</i></p> <p><i>21-396=-375</i></p> <p><i>21-397=-376</i></p> <p><i>21-398=-377</i></p> <p><i>21-399=-378</i></p> <p><i>21-400=-379</i></p> <p><i>21-401=-380</i></p> <p><i>21-402=-381</i></p> <p><i>21-403=-382</i></p> <p><i>21-404=-383</i></p> <p><i>21-405=-384</i></p> <p><i>21-406=-385</i></p> <p><i>21-407=-386</i></p> <p><i>21-408=-387</i></p> <p><i>21-409=-388</i></p> <p><i>21-410=-389</i></p> <p><i>21-411=-390</i></p> <p><i>21-412=-391</i></p> <p><i>21-413=-392</i></p> <p><i>21-414=-393</i></p> <p><i>21-415=-394</i></p> <p><i>21-416=-395</i></p> <p><i>21-417=-396</i></p> <p><i>21-418=-397</i></p> <p><i>21-419=-398</i></p> <p><i>21-420=-399</i></p> <p><i>21-421=-400</i></p> <p><i>21-422=-401</i></p> <p><i>21-423=-402</i></p> <p><i>21-424=-403</i></p> <p><i>21-425=-404</i></p> <p><i>21-426=-405</i></p> <p><i>21-427=-406</i></p> <p><i>21-428=-407</i></p> <p><i>21-429=-408</i></p> <p><i>21-430=-409</i></p> <p><i>21-431=-410</i></p> <p><i>21-432=-411</i></p> <p><i>21-433=-412</i></p> <p><i>21-434=-413</i></p> <p><i>21-435=-414</i></p> <p><i>21-436=-415</i></p> <p><i>21-437=-416</i></p> <p><i>21-438=-417</i></p> <p><i>21-439=-418</i></p> <p><i>21-440=-419</i></p> <p><i>21-441=-420</i></p> <p><i>21-442=-421</i></p> <p><i>21-443=-422</i></p> <p><i>21-444=-423</i></p> <p><i>21-445=-424</i></p> <p><i>21-446=-425</i></p> <p><i>21-447=-426</i></p> <p><i>21-448=-427</i></p> <p><i>21-449=-428</i></p> <p><i>21-450=-429</i></p> <p><i>21-451=-430</i></p> <p><i>21-452=-431</i></p> <p><i>21-453=-432</i></p> <p><i>21-454=-433</i></p> <p><i>21-455=-434</i></p> <p><i>21-456=-435</i></p> <p><i>21-457=-436</i></p> <p><i>21-458=-437</i></p> <p><i>21-459=-438</i></p> <p><i>21-460=-439</i></p> <p><i>21-461=-440</i></p> <p><i>21-462=-441</i></p> <p><i>21-463=-442</i></p> <p><i>21-464=-443</i></p> <p><i>21-465=-444</i></p> <p><i>21-466=-445</i></p> <p><i>21-467=-446</i></p> <p><i>21-468=-447</i></p> <p><i>21-469=-448</i></p> <p><i>21-470=-449</i></p> <p><i>21-471=-450</i></p> <p><i>21-472=-451</i></p> <p><i>21-473=-452</i></p> <p><i>21-474=-453</i></p> <p><i>21-475=-454</i></p> <p><i>21-476=-455</i></p> <p><i>21-477=-456</i></p> <p><i>21-478=-457</i></p> <p><i>21-479=-458</i></p> <p><i>21-480=-459</i></p> <p><i>21-481=-460</i></p> <p><i>21-482=-461</i></p> <p><i>21-483=-462</i></p> <p><i>21-484=-463</i></p> <p><i>21-485=-464</i></p> <p><i>21-486=-465</i></p> <p><i>21-487=-466</i></p> <p><i>21-488=-467</i></p> <p><i>21-489=-468</i></p> <p><i>21-490=-469</i></p> <p><i>21-491=-470</i></p> <p><i>21-492=-471</i></p> 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<p><i>21-531=-510</i></p> <p><i>21-532=-511</i></p> <p><i>21-533=-512</i></p> <p><i>21-534=-513</i></p> <p><i>21-535=-514</i></p> <p><i>21-536=-515</i></p> <p><i>21-537=-516</i></p> <p><i>21-538=-517</i></p> <p><i>21-539=-518</i></p> <p><i>21-540=-519</i></p> <p><i>21-541=-520</i></p> <p><i>21-542=-521</i></p> <p><i>21-543=-522</i></p> <p><i>21-544=-523</i></p> <p><i>21-545=-524</i></p> <p><i>21-546=-525</i></p> <p><i>21-547=-526</i></p> <p><i>21-548=-527</i></p> <p><i>21-549=-528</i></p> <p><i>21-550=-529</i></p> <p><i>21-551=-530</i></p> <p><i>21-552=-531</i></p> <p><i>21-553=-532</i></p> <p><i>21-554=-533</i></p> <p><i>21-555=-534</i></p> <p><i>21-556=-535</i></p> <p><i>21-557=-536</i></p> <p><i>21-558=-537</i></p> <p><i>21-559=-538</i></p> <p><i>21-560=-539</i></p> <p><i>21-561=-540</i></p> <p><i>21-562=-541</i></p> <p><i>21-563=-542</i></p> <p><i>21-564=-543</i></p> <p><i>21-565=-544</i></p> <p><i>21-566=-545</i></p> <p><i>21-567=-546</i></p> <p><i>21-568=-547</i></p> <p><i>21-569=-548</i></p> <p><i>21-570=-549</i></p> <p><i>21-571=-550</i></p> <p><i>21-572=-551</i></p> <p><i>21-573=-552</i></p> <p><i>21-574=-553</i></p> <p><i>21-575=-554</i></p> <p><i>21-576=-555</i></p> <p><i>21-577=-556</i></p> <p><i>21-578=-557</i></p> <p><i>21-579=-558</i></p> <p><i>21-580=-559</i></p> <p><i>21-581=-560</i></p> <p><i>21-582=-561</i></p> <p><i>21-583=-562</i></p> <p><i>21-584=-563</i></p> <p><i>21-585=-564</i></p> <p><i>21-586=-565</i></p> <p><i>21-587=-566</i></p> <p><i>21-588=-567</i></p> <p><i>21-589=-568</i></p> <p><i>21-590=-569</</i></p>	

QUESTION/VRAAG 3

must see first 3 and last terms
CA from first expansion
CA answer.
(2/3)

Expands to 10/17 for both = 2/3
Answer only
(3)
(2/3)

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3.1

$$\sum_{y=3}^{10} \frac{1}{y-2} - \sum_{y=3}^{10} \frac{1}{y-1}$$

(accurate)

$$= \left(\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{8} \right) - \left(\frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{8} + \frac{1}{9} \right)$$

$$= 1 - \frac{1}{9}$$

$$= \frac{8}{9} \checkmark$$

$$\checkmark \left(\frac{1}{1} + \frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{8} \right)$$

$$\checkmark \left(\frac{1}{2} + \frac{1}{3} + \dots + \frac{1}{8} + \frac{1}{9} \right)$$

✓ answer

3.2

$$\left(\frac{1}{3} \times \frac{2}{3} \right) + \left(\frac{2}{3} \times \frac{2}{3} \right) + \left(1 \times \frac{2}{3} \right) + \dots + \left(4 \times \frac{2}{3} \right)$$

$$= \frac{2}{9} + \frac{4}{9} + \frac{2}{3} + \dots + \frac{8}{3}$$

$a = \frac{2}{9} \checkmark \checkmark$ and $d = \frac{2}{3} - \frac{4}{9} = \frac{2}{9} \checkmark$

✓✓ a
 ✓ d

SEE NOTES

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

$$S_{12} = \frac{12}{2} \left[2 \left(\frac{2}{9} \right) + (12-1) \frac{2}{9} \right] \checkmark$$

$$= \frac{52}{3} \text{ m}^2 \checkmark$$

$$S_{12} = \frac{12}{2} \left(\frac{2}{9} + \frac{8}{3} \right)$$

$$= \frac{52}{3} \text{ m}^2$$

✓ substitution into the correct formula
 ✓ answer

NO penalty for rounding of units

\therefore for both sides $= 2 \times \frac{52}{3} = \frac{104}{3} = 34,67 \text{ m}^2 \checkmark$

✓ answer for both sides (6)

OR/OF

$$\frac{2}{9} \times (1+2+3+4+5+6+7+8+9+10+11+12) \times 2$$

$$= 34,67 \text{ m}^2 \checkmark$$

OR/OF

✓✓ a
 ✓✓ (1 + ... + 12)
 ✓ × 2
 ✓ answer (6)

OR/OF

$T_1 = \frac{2}{9} \times 12 = \frac{8}{3} \checkmark$ and $l = \frac{2}{9} \times 1 = \frac{2}{9} \checkmark$

✓✓ a

✓ $T_1 = \frac{8}{3} \checkmark$ $l = \frac{2}{9}$

$$2S_{12} = 2 \left(\frac{12}{2} \right) \left(\frac{8}{3} + \frac{2}{9} \right) \checkmark$$

$$= 34,67 \text{ m}^2 \checkmark$$

✓ substitution into correct formula
 ✓ answer (6)

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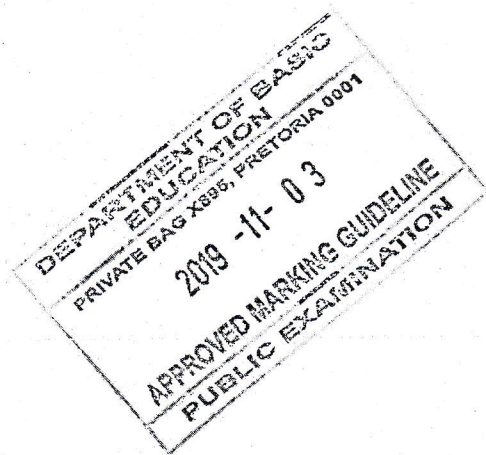
QUESTION/VRAAG 4

4.1	$p = -1$ ✓ <i>-1 ONLY</i> $x = p = -1$	✓ $p = -1$ (1)
4.2	$y = \frac{a}{x-1}$ $-3 = \frac{a}{0-1}$ ✓ $D(0; -3)$ ✓ $a = 3$ $y = x^2 + bx - 3$ $0 = (1)^2 + (1)b - 3$ ✓ $b = 2$	✓ coordinates $D(0; -3)$ ✓ substitute $(0; -3)$ ✓ substitute $(1; 0)$ (3)
4.3	$y = x^2 + 2x - 3$ axis of sym : $x = \frac{-b}{2a}$ $x = \frac{-2}{2(1)}$ ✓ $x = -1$ ✓ $y = (-1)^2 + 2(-1) - 3 = -4$ ✓ $C(-1; -4)$ OR/OF $\frac{dy}{dx} = 0$ $2x + 2 = 0$ ✓ $x = -1$ ✓ $y = (-1)^2 + 2(-1) - 3 = -4$ ✓ $C(-1; -4)$ <i>Answer ONLY</i> $\frac{1}{4}$ <i>0 implied</i> $2x+2$ $x=-1$ DEPARTMENT OF BASIC EDUCATION PRIVATE BAG 4899 PRETORIA 0001 2019-11-03 APPROVED MARKING GUIDELINE PUBLIC EXAMINATION	✓ substitution <i>SEE NOTES</i> ✓ $x = -1$ ✓ substitution ✓ $y = -4$ (4) OR/OF $\frac{-b}{2a}$; $\frac{4ac - b^2}{4a}$ ✓ derivative ✓ $x = -1$ ✓ substitution ✓ $y = -4$ (4)
4.4	$y \in [-4; \infty)$ or $y \geq -4$ $x \geq -4$ ✓ $\frac{1}{4}$ <i>CA from 4.3.</i>	✓ -4 ✓ answer (2) $y > -4$ $\frac{1}{4}$
4.5	$m = \tan 45^\circ = 1$ $y = mx + c$ ✓ $-4 = (1)(-1) + c$ $c = -3$ $y = x - 3$ ✓ <i>Answer ONLY</i> <i>full marks</i> $y = x + 1$ $\frac{1}{3}$ $y = 2x - 3$ $\frac{2}{3}$ <i>ANSWER ONLY</i>	✓ gradient ✓ subs m and $(-1; -4)$ ✓ equation (3)
4.6	No, the line passes through C and D <i>cuts at 2 points of f.</i> OR/OF No, a tangent through turning point C will have a gradient of 0 <i>tangent $y = -4$</i>	✓ No ✓ reason <i>Will also go through 0</i> (2) OR/OF ✓ No ✓ reason (2)

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<p>4.7</p> <p>$m \neq x$</p>	<p>$f(m-x) = f[-(x-m)]$</p> <p>f is reflected in the y-axis and translated 1 unit to the left and 4 units upwards.</p> <p>Therefore: $m = -1$ ✓✓ $q = 4$ ✓✓</p> <p>OR/OF</p> <p>Substitute $x = 0$ and $q = 4$ for one x-intercept</p> <p>$h(x) = (m-x)^2 + 2(m-x) - 3 + q$</p> <p>$h(0) = (m-0)^2 + 2(m-0) - 3 + 4$</p> <p>$0 = m^2 + 2m + 1$</p> <p>$0 = (m+1)^2$</p> <p>$m = -1$</p> <p>$q = 4$</p>	<p>✓✓ value of m</p> <p>✓✓ value of q (4)</p> <p>OR/OF</p> <p>SEE NOTES</p> <p>✓✓ value of m</p> <p>✓✓ value of q (4)</p>
<p>[19]</p>		

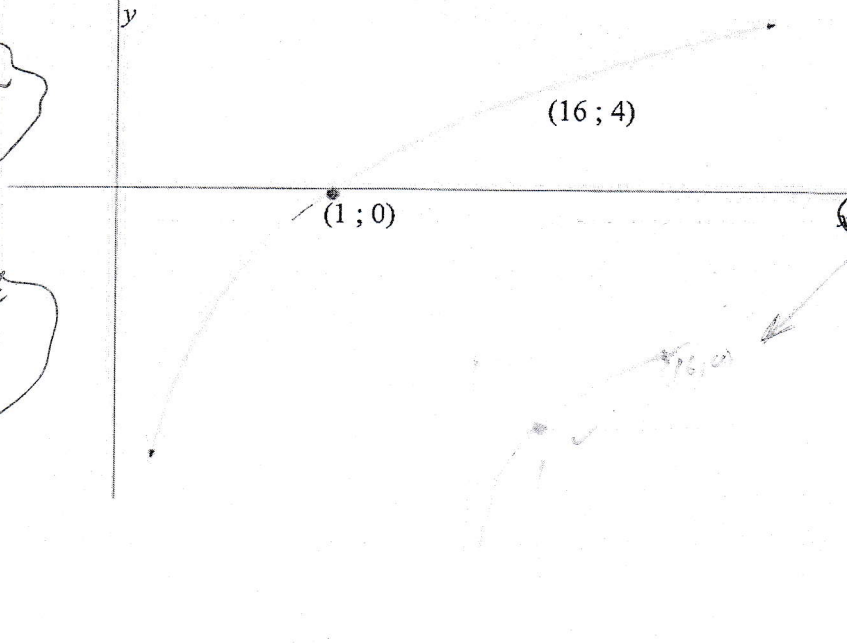


MS

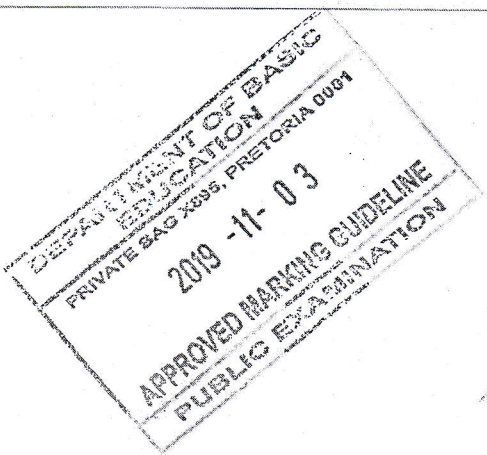
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QUESTION/VRAAG 5

<p>5.1</p>	<p>$f(x) = k^x$ $16 = k^4$ ✓ $k = 2$ ✓</p> <p>$4 = k^{16}$</p> <p><i>Answer ONLY</i> <i>full marks</i></p>	<p>✓ substitution (4; 16) ✓ answer (2)</p>
<p>5.2</p> <p><i>CA from 5.1 if k is positive</i></p>	<p>$f: y = 2^x$ $f^{-1}: x = 2^y$ ✓ $y = \log_2 x$</p> <p><i>Answer ONLY</i> <i>full marks</i></p> <p>If $y = -2^x$, then $x = \frac{-2^y}{2}$ ✓ $y = \log_2 \frac{-2^y}{2}$</p>	<p>✓ $x = 2^y$ ✓ $y = \log_2 x$ (2)</p>
<p>5.3</p> <p><i>CA from 5.2.</i> ↓ <i>1st check correct sketch.</i></p>		<p>✓ asymptote ✓ shape ✓ for any two valid points eg. (16; 4) or (2; 1) or (4; 2) or (1; 0) (4)</p> <p><i>Only if exp. of log graph separate marks</i></p>
<p>5.4.1</p>	<p>$x \in (1; \infty)$ or $x > 1$</p>	<p>✓ 1 ✓ answer (2)</p>
<p>5.4.2</p>	<p>$0 < x \leq \frac{1}{2}$ or $x \in \left(0; \frac{1}{2}\right]$</p> <p><i>Check candidates graph</i></p>	<p>✓ $\frac{1}{2}$ ✓ answer (2)</p>

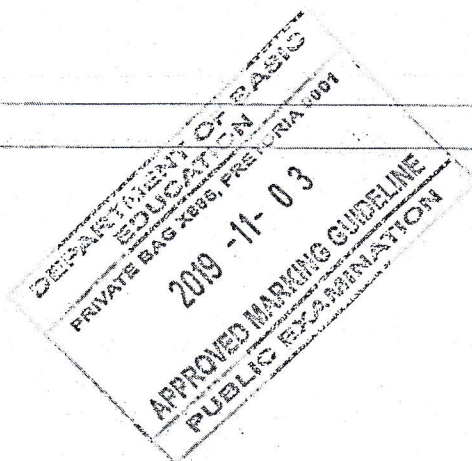
$x \leq \frac{1}{2}$
 $\left(\frac{1}{2}\right)$



MS

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<p>5.5</p> <p><i>No7 written</i> $\left(\frac{3}{4}\right)$</p>	<p>$2^x - 2^{-x} = \frac{15}{4}$ ✓</p> <p>$2^x - \frac{1}{2^x} = \frac{15}{4}$</p> <p>$2^{2x} - 1 = \frac{15}{4} \times 2^x$</p> <p>$4 \cdot 2^{2x} - 4 = 15 \times 2^x$</p> <p>$4 \cdot 2^{2x} - 15 \cdot 2^x - 4 = 0$ ✓</p> <p>$(4 \cdot 2^x + 1)(2^x - 4) = 0$ ✓</p> <p>$4 \cdot 2^x + 1 = 0$ or $2^x - 4 = 0$</p> <p>$2^x = \frac{-1}{4}$ or $2^x = 2^2$</p> <p>N/A $x = 2$ ✓</p> <p>OR/OF</p> <p>$2^x - 2^{-x} = \frac{15}{4}$ ✓</p> <p>$2^x - \frac{1}{2^x} = \frac{15}{4}$</p> <p>Let $k = 2^x$</p> <p>$k^2 - 1 = \frac{15}{4} \times k$</p> <p>$4 \cdot k^2 - 4 = 15 \times k$</p> <p>$4 \cdot k^2 - 15 \cdot k - 4 = 0$ ✓</p> <p>$(4 \cdot k + 1)(k - 4) = 0$ ✓</p> <p>$k = \frac{-1}{4}$ or $k = 4$</p> <p>$2^x = \frac{-1}{4}$ or $2^x = 2^2$</p> <p>N/A $x = 2$ ✓</p> <p><i>Notes</i> $2^x - 2^{-x} = \frac{15}{4}$ then $x = 2$ full marks $\left(\frac{3}{4}\right)$</p>	<p>$\checkmark 2^x - 2^{-x} = \frac{15}{4}$</p> <p>$\checkmark$ standard form</p> <p>\checkmark factors</p> <p>\checkmark answer (4)</p> <p>OR/OF</p> <p>\checkmark</p> <p>$2^x - 2^{-x} = \frac{15}{4}$</p> <p>$\checkmark$ standard form</p> <p>\checkmark factors</p> <p>\checkmark answer (4)</p>
		[16]



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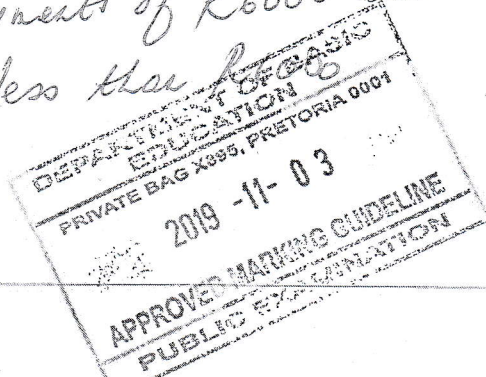
QUESTION/VRAAG 6

<p>6.1</p>	<p>Kuda: $A = P(1 + in)$ $= 5\,000(1 + 0,083 \times 4)$ ✓ $= R6\,660,00$ Final Answer: $R6\,660,00 + R266,40$ $= R6\,926,40$ ✓</p> <p>OR/OF Kuda: $A = P(1 + in) \times 1,04$ $= 5\,000(1 + 0,083 \times 4) \times 1,04$ $= R6\,926,40$ ✓</p> <p>Thabo: $A = P(1 + i)^n$ $= 5\,000 \left(1 + \frac{0,081}{12}\right)^{12 \times 4}$ ✓ $= R6\,905,71$ ✓</p> <p>Kuda will have a better investment ✓ (independent of calculations)</p>	<p>✓ substitution into the correct formula ✓ final answer</p> <p>OR/OF ✓ substitution into the correct formula ✓ final answer</p> <p>✓ substitution into the correct formula ✓ answer</p> <p>✓ conclusion (5)</p>
<p>6.2.1</p> <p>Penalty for early rounding answer = 159 $\left(\frac{4}{5}\right)$</p>	<p>$P = \frac{x[1 - (1 + i)^{-n}]}{i}$</p> <p>$525\,000 = \frac{6\,000 \left[1 - \left(1 + \frac{0,1}{12}\right)^{-n}\right]}{0,1/12}$ ✓ (subst. into P)</p> <p>$\frac{35}{48} = 1 - \left(1 + \frac{0,1}{12}\right)^{-n}$ ✓</p> <p>$-\log\left(1 + \frac{0,1}{12}\right) = \log\frac{13}{48}$ ✓</p> <p>$-n = \frac{\log\frac{13}{48}}{\log\left(1 + \frac{0,1}{12}\right)}$</p> <p>$n = 157,40 \rightarrow$ No mark. $n = 158$ payments ✓</p> <p>157 payments of R6000 and one of less than R6000</p> <p>OR/OF</p>	<p>✓ $\frac{0,1}{12}$</p> <p>✓ substitution into the correct formula</p> <p>✓ simplification ✓ correct use of logs</p> <p>✓ answer (5)</p> <p>OR/OF</p>

Simple interest loses both marks

$\left(1 + \frac{0,081}{12}\right)^4$
 No CA

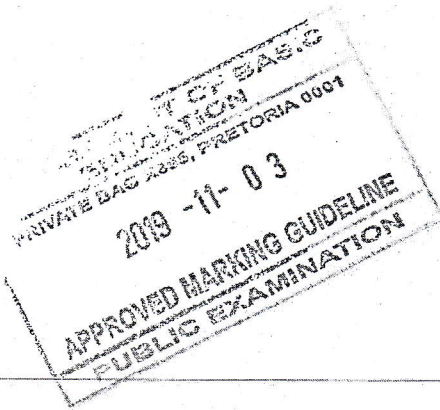
Future value formula $\left(\frac{1}{5}\right)$ for i



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	$P = \frac{x[1 - (1+i)^{-n}]}{i}$ $525\,000 = \frac{6\,000 \left[1 - \left(1 + \frac{0,1}{12} \right)^{-12n} \right]}{\frac{0,1}{12}}$ $\frac{35}{48} = 1 - \left(1 + \frac{0,1}{12} \right)^{-12n}$ $-12n \log \left(1 + \frac{0,1}{12} \right) = \log \frac{13}{48}$ $-12n = \frac{\log \frac{13}{48}}{\log \left(1 + \frac{0,1}{12} \right)}$ $n = \frac{\log \frac{13}{48}}{\log \left(1 + \frac{0,1}{12} \right)} \times \frac{1}{12}$ $n = 13,11686841$ <p>Number of payments = $13,11686841 \times 12 = 157,40$ $n = 158$ payments ✓</p>	<p>✓ $\frac{0,1}{12}$</p> <p>✓ substitution into the correct formula</p> <p>✓ simplification</p> <p>✓ use of logs</p> <p>✓ answer</p> <p>(5)</p>
<p>6.2.2</p>	<p>Difference: $R6\,000 - R5\,066,36 = R933,64$ ✓</p> $F = \frac{x[(1+i)^n - 1]}{i}$ $F = \frac{933,64 \left[\left(1 + \frac{0,1}{12} \right)^{108} - 1 \right]}{\frac{0,1}{12}}$ <p><i>✓ substit in F</i></p> <p>$= R162\,503,51$ ✓</p>	<p>✓ $R933,64$ (independent)</p> <p>✓ $n = 108$ (independent of formula)</p> <p>✓ substitution into the correct formula</p> <p>✓ answer</p> <p>(4)</p>
	<p>OR/OF</p>	<p>OR/OF</p>



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

$$F = \frac{6000 \left[\left(1 + \frac{0,1}{12}\right)^{108} - 1 \right]}{\frac{0,1}{12}}$$

subst

$$= R1\ 044\ 322,28$$

$$F = \frac{5\ 066,36 \left[\left(1 + \frac{0,1}{12}\right)^{108} - 1 \right]}{\frac{0,1}{12}}$$

subst

$$F = R881\ 818,77\dots$$

Amount available for withdrawal
 = R1 044 322,28 – R 881 818,77
 = R162 503,51 ✓

OR/OF

Outstanding balance with monthly repayment of R5 066,36

$$= 525\ 000 \left(1 + \frac{0,1}{12}\right)^{108} - \frac{5\ 066,36 \left[\left(1 + \frac{0,1}{12}\right)^{108} - 1 \right]}{\frac{0,1}{12}}$$

subst (both)

$$= R404\ 666,23$$

Outstanding balance with monthly repayment of R6 000

$$= 525\ 000 \left(1 + \frac{0,1}{12}\right)^{108} - \frac{6\ 000 \left[\left(1 + \frac{0,1}{12}\right)^{108} - 1 \right]}{\frac{0,1}{12}}$$

subst (both)

$$= R242\ 162,72$$

Amount available for withdrawal
 R404 666,23 – R242 162,72 = R162 503,51
R162 503,51

✓ n = 108
 ✓ substitution into correct formula

✓ substitution into correct formula

✓ final answer

(4)

OR/OF

✓ n = 108
 ✓ substitution into the correct formula

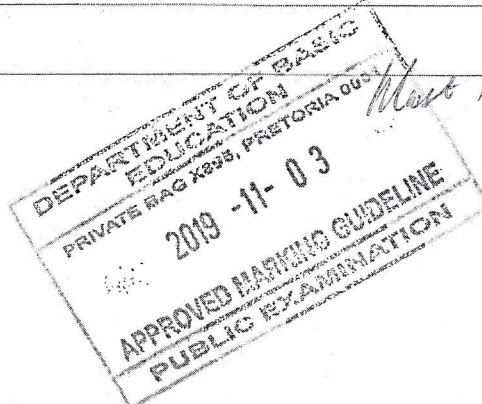
✓ substitution into the correct formula

✓ final answer

(4)

R162 503,...

[14]



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

QUESTION/VRAAG 7

Penalty for notation only in 7.1

<p>7.1</p>	<p>$f(x) = 4 - 7x$</p> <p>$f'(x) = \lim_{h \rightarrow 0} \frac{f(x+h) - f(x)}{h}$</p> <p>$= \lim_{h \rightarrow 0} \frac{4 - 7(x+h) - (4 - 7x)}{h}$ ✓ <i>subst</i></p> <p>$= \lim_{h \rightarrow 0} \frac{h(-7)}{h}$ ✓</p> <p>$= -7$ ✓</p>	<p>✓ $4 - 7(x+h)$</p> <p>✓ substitution</p> <p>✓ simplification</p> <p>✓ answer (4)</p> <p><i>If 4 not seen, penalize/mark for substitution</i></p>
<p>7.2</p>	<p>$y = 4x^8 + \sqrt{x^3}$</p> <p>$= 4x^8 + x^{\frac{3}{2}}$ ✓ <i>(exp must be fraction then CA)</i></p> <p>$\frac{dy}{dx} = 32x^7 + \frac{3}{2}x^{\frac{1}{2}}$ ✓</p>	<p>✓ x^3</p> <p>✓ $32x^7$</p> <p>✓ $\frac{3}{2}x^{\frac{1}{2}}$</p> <p>(3)</p>
<p>7.3.1</p>	<p>$y = ax^2 + a$</p> <p>$\frac{dy}{dx} = 2ax + 0$</p> <p>$\frac{dy}{dx} = 2ax$ ✓</p> <p><i>$2ax + a^0 / 2ax + a^0$</i> <i>$2ax + 0$</i></p>	<p>✓ $2ax$</p> <p>(1)</p>
<p>7.3.2</p>	<p>$y = ax^2 + a$</p> <p>$\frac{dy}{da} = x^2 + 1$ ✓ ✓</p> <p><i>$x^2 + a^0$ ✓</i></p>	<p>✓ ✓ answer</p> <p>(2)</p>

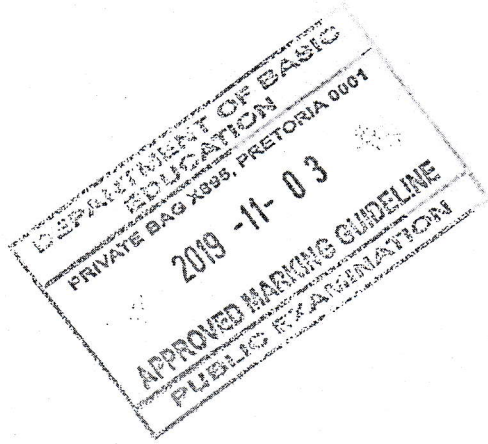
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 PRIVATE BAG X895, PRETORIA 0001
 2019-11-03
 APPROVED MARKING GUIDELINE
 PUBLIC EXAMINATION

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<p>7.4</p>	<p>Substitute (2 ; b) in $y = x + \frac{12}{x}$</p> $b = 2 + \frac{12}{2}$ $b = 8 \checkmark \quad / y = 8$ $m_{\text{tangent}} = \frac{dy}{dx}$ $\frac{dy}{dx} = 1 - \frac{12}{x^2} \checkmark \quad / 1 - 12x^{-2}$ $m_{\text{tangent}} = 1 - \frac{12}{2^2} = -2$ <p><i>If use as gradient -2</i></p> $m_{\text{perp}} = \frac{1}{2} \checkmark$ <p>Equation of perpendicular line:</p> $y - y_1 = m(x - x_1) \quad \text{OR} \quad y = mx + c$ $y - 8 = \frac{1}{2}(x - 2) \quad 8 = \frac{1}{2}(2) + c$ $y = \frac{1}{2}x + 7 \checkmark \quad c = 7$ $y = \frac{1}{2}x + 7$	<p>$\frac{dy}{dx} = 1 - 12x^{-2}$ CA from here ↓ gradients</p> <p>✓ value of b</p> <p>✓ $\frac{dy}{dx} = 1 - \frac{12}{x^2}$</p> <p>✓ gradient of perpendicular line</p> <p>✓ equation (4)</p> <p>[14]</p>
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Must see ← derivative for gradient



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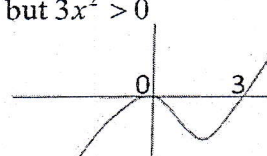
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QUESTION/VRAAG 8

8.1	36cm ✓	✓ answer (1)
8.2	∴ $t = 6$ ($-2t^2 + 3t - 6$) have no real roots Insect reaches the floor only once. <i>Answer ONLY</i> $t = 6$ (3)	ONLY $t = 6$ (3) ✓✓✓ only once (3)
8.3	$h(t) = -2t^3 + 15t^2 - 24t + 36$ ✓ $h'(t) = -6t^2 + 30t - 24$ $-6t^2 + 30t - 24 = 0$ ✓ <i>(must be = 0)</i> $t^2 - 5t + 4 = 0$ $(t - 4)(t - 1) = 0$ $t = 4$ or $t = 1$ ✓ Only $t = 4$ because maximum value required $h = -2(4)^3 + 15(4)^2 - 24(4) + 36 = 52$ cm	✓ expansion ✓ $-6t^2 + 30t - 24 = 0$ ✓ both values ✓ answer (4)
		[8]

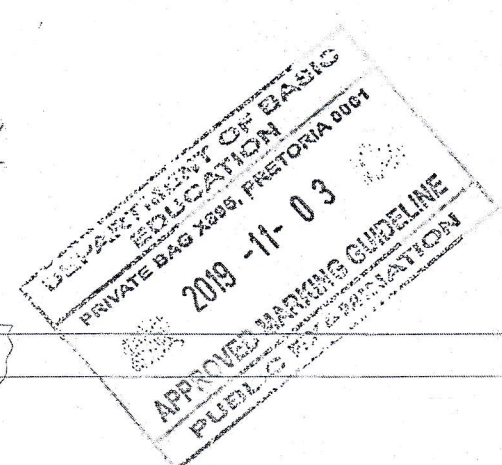
QUESTION/VRAAG 9

9.1	$f'(x) = 9x^2$ ✓ $3x^3 = 9x^2$ $3x^3 - 9x^2 = 0$ $3x^2(x - 3) = 0$ $x = 0$ ✓ or $x = 3$ ✓	✓ $f'(x) = 9x^2$ ✓ $x = 0$ ✓ $x = 3$ (3)
9.2.1	For f and f' ✓	✓ answer (1)
9.2.2	The point $(0 ; 0)$ is : A point of inflection of f ✓ A turning point of f' ✓ <i>(Annoërens)</i>	✓ f : inflection point ✓ f' : turning point (2)
9.3	$f''(x) = 18x$ ✓ Distance = $f''(1) - f'(1)$ $= 18(1) - 9(1)^2$ ✓ $= 9$ ✓	✓ $f''(x) = 18x$ <i>check answer in 9.2. for $f''(x)$</i> ✓ substitution ✓ answer (3)
9.4	$3x^3 - 9x^2 < 0$ ✓ $3x^2(x - 3) < 0$ ✓ but $3x^2 > 0$  ∴ $x - 3 < 0$ ∴ $x < 3, x \neq 0$	✓ $3x^3 - 9x^2 < 0$ ✓ factors ✓ $x < 3$ ✓ $x \neq 0$ (4)
		[13]

$x^2 + 9x^2 = 0$
 $x^2(x+9) = 0$
 $= 0 \Rightarrow x = -9$
(2/3)

If $f'(x) = 6x^2$

Show $f'' = 18x$
Answer ONLY = (3/3)
Answer ONLY
No f'' (3)



Answer ONLY
(4/4)
 $x < 3; x \neq 0$

M2
Q

QUESTION/VRAAG 10

$\frac{1}{2} \times \frac{1}{2} = \frac{1}{4} \times \left(\frac{2}{2}\right)$ $\frac{1}{4} \approx 0,25 = 25\%$ $\frac{1}{4} \times \frac{1}{4} = \frac{1}{16}$

10.1	$P(\text{same day}) = \frac{4}{16}$ or $\frac{1}{4}$ or 0,25 or 25%	✓ 4 numerator ✓ 16 denominator	SEE NOTES (2)
10.2	$P(2 \text{ consecutive days}) = \frac{3 \times 2}{16} = \frac{3}{8}$	✓ 3×2 ✓ answer	(3) [5]

QUESTION/VRAAG 11

$\frac{1}{4} \times \frac{1}{4} \times 2 \times 3$ Applying etc =

11.1.1	<p>$P(A) \times P(B)$ independent events $= 0,40 \times 0,25 = 0,1$ <i>Only $P(A \text{ and } B) = 0,1$</i></p>	<p>✓ 0,1 ✓ 0,15 and 0,3 ✓ 0,45 (3)</p>
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11.1.2	<p>$P(A \text{ or not } B) = P(A) + P(\text{not } B) - P(A \text{ and not } B)$ $= 0,4 + 0,75 - 0,3$ $= 0,85$ OR/OF $P(A \text{ or not } B) = 1 - P(\text{only } B)$ $= 1 - 0,15$ $= 0,85$ OR/OF From Venn diagram: $0,3 + 0,1 + 0,45 = 0,85$</p>	<p>✓ substitution ✓ answer (2) OR/OF ✓ $1 - 0,15$ ✓ answer (2) OR/OF ✓ substitution ✓ answer (2)</p>
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11.2	<p>$(5 \times 1 \times 5) + (5 \times 1 \times 6) + (5 \times 1 \times 6) + (5 \times 1 \times 5) = 110$ <i>CONSULT DCM for other methods</i> $110 \times 5 = 550 > 500$ Not possible, because not enough space OR/OF</p>	<p>✓ $5 \times 1 \times 5$ ✓ $5 \times 1 \times 6$ ✓ $5 \times 1 \times 6$ ✓ $5 \times 1 \times 5$ ✓ 110 ✓ conclusion (6) OR/OF</p>
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can use %

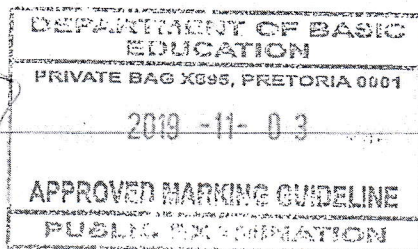
Answer ONLY full marks

All 3 values Answer

Sample space must add up to 1 otherwise 0,0

ONLY conclusion $\frac{0}{6}$

No and conclusion full marks $\frac{0}{6}$

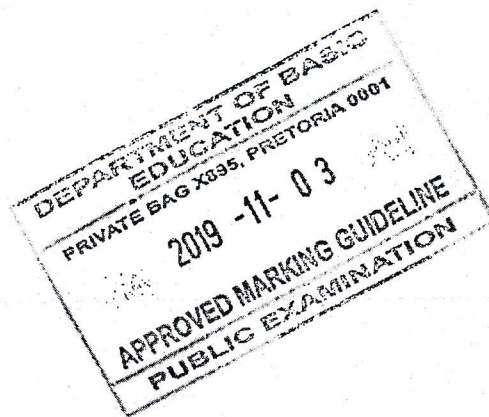


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<p>$(5 \times 2 \times 5) + (5 \times 2 \times 6) = 110$ ✓</p> <p>$110 \times 5 = 550 > 500$</p> <p>Not possible because not enough space ✓</p> <p>OR/OF</p> <p>$5 \times 4 \times 6 = 120$ ✓</p> <p>$5 \times 2 = 10$ ✓</p> <p>$\therefore 120 - 10 = 110$ ✓</p> <p>$110 \times 5 = 550 > 500$</p> <p>Not possible because not enough space ✓</p>	<p>✓✓ $5 \times 2 \times 5$ / $2 \times 5 \times 5$</p> <p>✓✓ $5 \times 2 \times 6$ / $2 \times 5 \times 6$</p> <p>✓ 110</p> <p>✓ conclusion (6)</p> <p>OR/OF</p> <p>✓✓ $5 \times 4 \times 6 = 120$</p> <p>✓ $5 \times 2 = 10$</p> <p>✓ $120 - 10$</p> <p>✓ 110</p> <p>✓ conclusion (6)</p>
[11]	

*End up 90 ✓
Correct conclusion (6)*

TOTAL/TOTAAL: 150



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