

GRADE 10  
NOVEMBER PAPER 2  
MATHEMATICS  
EXAM PAPERS  
SOLUTIONS  
2012-2019

Compiled by L Emery

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**NOTE:**

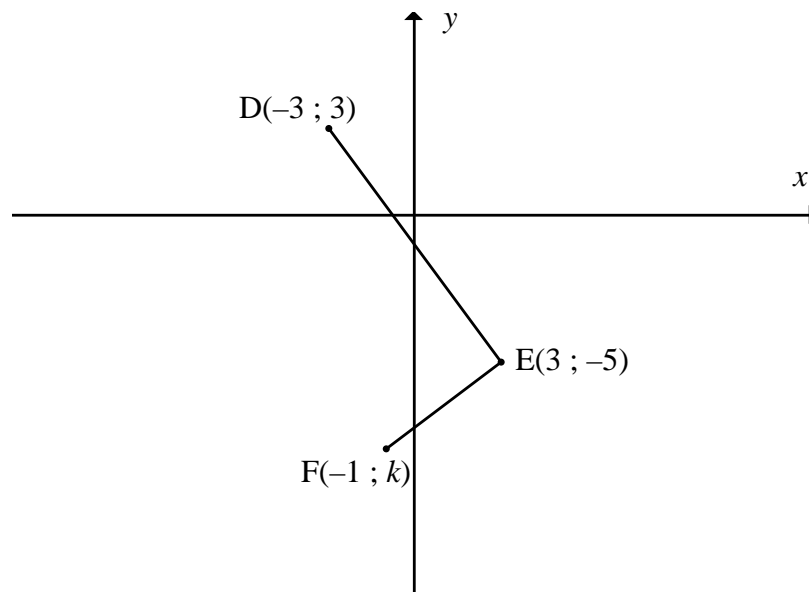
- If a candidate answers a question TWICE, only mark the FIRST attempt.
- If a candidate has crossed out an attempt of a question and not redone the question, mark the crossed out version.
- Consistent accuracy applies in ALL aspects of the marking memorandum.
- Assuming answers/values in order to solve a problem is NOT acceptable.

**QUESTION 1**

1.1	$\text{Mean} = \frac{\sum_{i=1}^n x_i}{n} = \frac{929}{19} = 48,89$	✓ $\frac{929}{19}$ ✓ answer (2)
1.2	31 ; 31 ; 34 ; 36 ; 37 ; 39 ; 40 ; 43 ; 46 ; 46 ; 48 ; 52 ; 56 ; 60 ; 62 ; 63 ; 65 ; 66 ; 74.  Median = 46	✓ arranging in ascending order  ✓ median (2)
1.3	Lower quartile = 37 Upper quartile = 62	✓ lower quartile ✓ upper quartile (2)
1.4		✓ box with median ✓ whisker (2) <b>[8]</b>

**QUESTION 2**

2.1	The modal class is $2500 \leq x < 4500$	✓ $2500 \leq x < 4500$ (1)																																
2.2	<table border="1" data-bbox="268 450 1054 1039"> <thead> <tr> <th>Gross Vehicle Mass (GVM) (in kg)</th> <th>Frequency</th> <th>Midpoint</th> <th>Frequency × midpoint</th> </tr> </thead> <tbody> <tr> <td><math>2500 \leq x &lt; 4500</math></td> <td>103</td> <td>3500</td> <td>360 500</td> </tr> <tr> <td><math>4500 \leq x &lt; 6500</math></td> <td>19</td> <td>5500</td> <td>104 500</td> </tr> <tr> <td><math>6500 \leq x &lt; 8500</math></td> <td>70</td> <td>7500</td> <td>525 000</td> </tr> <tr> <td><math>8500 \leq x &lt; 10500</math></td> <td>77</td> <td>9500</td> <td>731 500</td> </tr> <tr> <td><math>10500 \leq x &lt; 12500</math></td> <td>85</td> <td>11500</td> <td>977 500</td> </tr> <tr> <td><math>12500 \leq x &lt; 14500</math></td> <td>99</td> <td>13500</td> <td>1 336 500</td> </tr> <tr> <td>Sum</td> <td>453</td> <td></td> <td>4 035 500</td> </tr> </tbody> </table> <p data-bbox="268 1077 868 1155">Estimated mean <math>(\bar{X}) = \frac{4035500}{453} = 8908,39 \text{ kg.}</math></p>	Gross Vehicle Mass (GVM) (in kg)	Frequency	Midpoint	Frequency × midpoint	$2500 \leq x < 4500$	103	3500	360 500	$4500 \leq x < 6500$	19	5500	104 500	$6500 \leq x < 8500$	70	7500	525 000	$8500 \leq x < 10500$	77	9500	731 500	$10500 \leq x < 12500$	85	11500	977 500	$12500 \leq x < 14500$	99	13500	1 336 500	Sum	453		4 035 500	✓ midpoints ✓✓ frequencies × midpoint  ✓ 4 035 500 ✓ answer (5)
Gross Vehicle Mass (GVM) (in kg)	Frequency	Midpoint	Frequency × midpoint																															
$2500 \leq x < 4500$	103	3500	360 500																															
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$12500 \leq x < 14500$	99	13500	1 336 500																															
Sum	453		4 035 500																															
2.3	The estimated mean. It is more at the centre of the data set. The modal class is found at the extreme left-hand side of the data set.	✓ estimated mean with reason  (1) [7]																																

**QUESTION 3**

3.1.1	$DE = \sqrt{(-3-3)^2 + (3-(-5))^2}$ $= \sqrt{100}$ $= 10$	✓ substitution into distance formula ✓ answer (2)
3.1.2	$m_{DE} = \frac{-5-3}{3-(-3)}$ $= -\frac{4}{3}$	✓ substitution into gradient formula ✓ answer (2)
3.1.3	$m_{EF} = \frac{3}{4} \quad EF \perp DE$ $\frac{-5-k}{3-(-1)} = \frac{3}{4}$ $\frac{-5-k}{4} = \frac{3}{4}$ $-20-4k = 12$ $-4k = 32$ $k = -8$	✓ $m_{EF} = \frac{3}{4}$ ✓ $\frac{-5-k}{3-(-1)} = \frac{3}{4}$ ✓ simplification ✓ $k = -8$ (4)
3.1.4	$M\left(\frac{(-3)+(-1)}{2}; \frac{3+(-8)}{2}\right)$ $= \left(-2; -\frac{5}{2}\right)$	✓ substitution into midpoint formula ✓ answer (2)

3.1.5	<p>If DEFG is a rectangle then M is also the midpoint of EG. Let the coordinates of G be <math>(x; y)</math>  <math display="block">\left(\frac{x+3}{2}; \frac{y+(-5)}{2}\right) = \left(-2; -\frac{5}{2}\right)</math></p> $\frac{x+3}{2} = -2 \qquad \qquad \frac{y-5}{2} = -\frac{5}{2}$ $x+3 = -4 \qquad \qquad \text{and} \qquad y-5 = -5$ $x = -7 \qquad \qquad \qquad y = 0$ <p><math>\therefore G(-7; 0)</math></p> <p style="text-align: center;"><b>OR</b></p> <p>The translation that sends <math>E(3; -5)</math> to <math>F(-1; -8)</math> also sends <math>D(-3; 3)</math> to G.  <math>(-1; -8) = (3 - 4; -5 - 3)</math>  <math>\therefore G = (-3 - 4; 3 - 3) = (-7; 0)</math></p> <p style="text-align: center;"><b>OR</b></p> <p>The translation that sends <math>E(3; -5)</math> to <math>D(-3; 3)</math> also sends <math>F(-1; -8)</math> to G.  <math>(-3; 3) = (3 - 6; -5 + 8)</math>  <math>\therefore G = (-1 - 6; -8 + 8) = (-7; 0)</math></p>	$\checkmark \frac{x+3}{2} = -2$ $\checkmark x = -7$ $\checkmark \frac{y-5}{2} = -\frac{5}{2}$ $\checkmark y = 0$ <p style="text-align: right;">(4)</p> $\checkmark \text{method}$ $\checkmark x - 4$ $\checkmark y - 3$ $\checkmark \text{answer}$ <p style="text-align: right;">(4)</p> $\checkmark \text{method}$ $\checkmark x - 6$ $\checkmark y + 8$ $\checkmark \text{answer}$ <p style="text-align: right;">(4)</p>
3.2	$\sqrt{(x-1)^2 + (5-(-2))^2} = \sqrt{53}$ $(x-1)^2 + 49 = 53$ $x^2 - 2x + 1 + 49 - 53 = 0$ $x^2 - 2x - 3 = 0$ $(x+1)(x-3) = 0$ $x = -1 \quad \text{or} \quad x = 3$ <p>but D is in the second quadrant  <math>\therefore</math> only <math>x = -1</math> is valid</p>	$\checkmark \text{equation using distance formula}$ $\checkmark \text{standard form}$ $\checkmark \text{factorisation}$ $\checkmark \text{answer must exclude 3}$ <p style="text-align: right;">(4)</p> <p style="text-align: right;"><b>[18]</b></p>

**QUESTION 4**

4.1.1	$\sin C = \frac{AB}{AC}$	✓ AC (1)
4.1.2	$\cot A = \frac{AB}{BC}$	✓ cot A (1)
4.2	$\frac{\sin 60^\circ \cdot \tan 30^\circ}{\sec 45^\circ}$ $= \left(\frac{\sqrt{3}}{2}\right) \left(\frac{1}{\sqrt{3}}\right)$ $= \frac{1}{\sqrt{2}}$ $= \frac{2}{\sqrt{2}}$ $= \frac{1}{2} \times \frac{1}{\sqrt{2}}$ $= \frac{1}{2\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}}$ $= \frac{\sqrt{2}}{4}$	✓✓ substitution  ✓ simplification  ✓ answer (4)
4.3.1	$r^2 = (-5)^2 + (12)^2$ $r^2 = 169$ $r = 13$ $\cos \theta = -\frac{5}{13}$	✓ $r^2 = (-5)^2 + (12)^2$ ✓ $r = 13$ ✓ answer (3)
4.3.2	$\operatorname{cosec}^2 \theta + 1$ $= \left(\frac{13}{12}\right)^2 + 1$ $= \frac{169}{144} + \frac{144}{144}$ $= \frac{313}{144}$	✓ $= \frac{13}{12}$ ✓ simplification ✓ answer (3) <b>[12]</b>

**QUESTION 5**

5.1.1	$5 \cos x = 3$ $\cos x = \frac{3}{5}$ $x = \cos^{-1}\left(\frac{3}{5}\right)$ $x = 53,1^\circ$	$\checkmark \cos x = \frac{3}{5}$ $\checkmark$ answer (2)
5.1.2	$\tan 2x = 1,19$ $2x = \tan^{-1}(1,19)$ $2x = 49,95845.....^\circ$ $x = 25^\circ$	$\checkmark \checkmark 2x = 49,958....^\circ$ $\checkmark$ answer (3)
5.1.3	$4 \sec x - 3 = 5$ $4 \sec x = 8$ $\sec x = 2$ $\frac{1}{\sec x} = \frac{1}{2}$ $\cos x = \frac{1}{2}$ $x = \cos^{-1}\left(\frac{1}{2}\right)$ $x = 60^\circ$	$\checkmark \sec x = 2$ $\checkmark$ inverting both sides $\checkmark \cos x$ $\checkmark$ answer (4)
5.2.1	$\hat{J}KD = 8^\circ$ alternate angles	$\checkmark$ answer (1)
5.2.2	$\tan 8^\circ = \frac{5}{DK}$ $DK = \frac{5}{\tan 8^\circ}$ $DK = 35,57684..... \text{ km}$ $DK = 35\,577 \text{ m}$	$\checkmark \tan 8^\circ = \frac{5}{DK}$ $\checkmark DK = \frac{5}{\tan 8^\circ}$ $\checkmark$ answer (3)
5.2.3	$DS = 35,58 - 8 = 27,58 \text{ km}$	$\checkmark$ answer (1)
5.2.4	$\tan \hat{D}SJ = \frac{5}{27,58}$ $\hat{D}SJ = \tan^{-1}\left(\frac{5}{27,58}\right)$ $\hat{D}SJ = 10,3^\circ$	$\checkmark \tan \hat{D}SJ = \frac{5}{27,58}$ $\checkmark$ answer (2) <b>[16]</b>



**QUESTION 6**

<p>6.1.1</p>		<ul style="list-style-type: none"> <li>✓ correct <math>x</math>-intercepts</li> <li>✓ correct <math>y</math>-intercept</li> <li>✓ asymptotes</li>   <li>✓ shape (must pass through <math>(45^\circ ; 2)</math>)</li> </ul> <p style="text-align: right;">(4)</p>
<p>6.1.2</p>	<p><math>y = -2 \tan x</math></p>	<ul style="list-style-type: none"> <li>✓ answer</li> </ul> <p style="text-align: right;">(1)</p>
<p>6.2.1</p>	<p><math>g(x) = a \sin x</math>  <math>4 = a \sin 90^\circ</math>  <math>4 = a(1)</math>  <math>a = 4</math></p>	<ul style="list-style-type: none"> <li>✓ <math>a = 4</math></li> </ul> <p style="text-align: right;">(1)</p>
<p>6.2.2</p>	<p>Range is <math>-2 \leq y \leq 6</math>.</p>	<ul style="list-style-type: none"> <li>✓ <math>-2</math></li> <li>✓ <math>6</math></li> </ul> <p style="text-align: right;">(2)  <b>[8]</b></p>

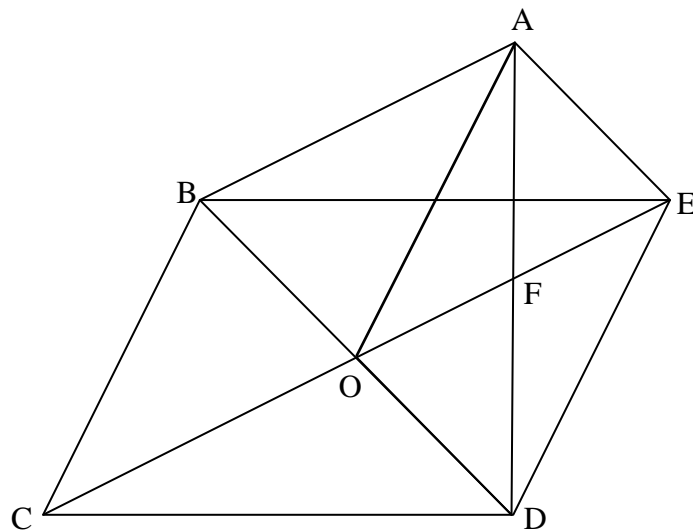
**QUESTION 7**

7.1.1	$AH^2 = 0,8^2 + 1,5^2$ $AH^2 = 2,89$ $AH = 1,7$	$\checkmark AH^2 = 0,8^2 + 1,5^2$ $\checkmark AH = 1,7$ (2)
7.1.2	Surface area of roof = $4 \times \frac{1}{2}(3 \times 1,7)$ = $10,2 \text{ m}^2$	$\checkmark 4 \times \frac{1}{2}(3 \times 1,7)$ $\checkmark$ answer (2)
7.1.3	Surface area of walls = $4 \times 3 \times 2,1$ = $25,2 \text{ m}^2$  Total surface area = $10,2 \text{ m}^2 + 25,2 \text{ m}^2 = 35,4 \text{ m}^2$	$\checkmark 25,2 \text{ m}^2$ $\checkmark$ answer (2)
7.2.1	Volume = $\frac{4}{3}\pi(8)^3$ = $2144,66 \text{ mm}^3$	$\checkmark \frac{4}{3}\pi(8)^3$ $\checkmark$ answer (2)
7.2.2	New volume : original volume = $2^3 : 1$ = $8 : 1$	$\checkmark 2^3$ $\checkmark$ answer (2)
7.2.3	Volume including silver = $\frac{4}{3}\pi(9)^3 = 3\,053,63 \text{ mm}^3$ . Volume of silver = $3\,053,63 - 2144,66$ = $908,97 \text{ mm}^3$	$\checkmark \frac{4}{3}\pi(9)^3$ $\checkmark$ answer (2) <b>[12]</b>

**QUESTION 8**

8.1	OQ = 2 cm .... (the long diagonal of a kite bisects the shorter diagonal)	$\checkmark 2 \text{ cm}$ $\checkmark$ correct reason (2)
8.2	$\hat{P}OQ = 90^\circ$ .... (the diagonals of a kite intersect at right angles)	$\checkmark 90^\circ$ $\checkmark$ correct reason (2)
8.3	$\hat{Q}PO = 20^\circ$ .... (the longer diagonal bisects the angles of a kite)  $\therefore \hat{Q}PS = 20^\circ + 20^\circ = 40^\circ$	$\checkmark \hat{Q}PO = 20^\circ$ with correct reason  $\checkmark \hat{Q}PS = 40^\circ$ (2) <b>[6]</b>

**QUESTION 9**



<p>9.1</p>	<p>O is the midpoint of BD. .... (Diagonals of parm BCDE bisect each other)</p> <p>F is the midpoint of OE. .... (Diagonals of parm AODE bisect each other)</p> <p><math>\therefore OF \parallel AB</math> .... (The line joining the midpoints of two sides in a <math>\Delta</math> is <math>\parallel</math> to third side)</p>	<p>✓ O is the midpoint of BD                  ✓ reason – diagonals of parm                  ✓ F is the midpoint of OE</p> <p>✓ reason – midpoint theorem                  (4)</p>
<p>9.2</p>	<p><math>AE \parallel OD</math>  <math>\therefore AE \parallel OB</math> .... (Opp sides of parm AODE are parallel)</p> <p><math>OF \parallel AB</math> .... (proven above)  <math>\therefore OE \parallel AB</math></p> <p><math>\therefore ABOE</math> is a parallelogram .... (both pairs of opposite sides of quad are parallel)</p>	<p>✓ <math>AE \parallel OB</math>                  ✓ reason</p> <p>✓ <math>OE \parallel AB</math></p> <p>✓ reason – opp sides parallel                  (4)</p>
<p>9.3</p>	<p>In <math>\Delta ABO</math> and <math>\Delta EOD</math></p> <p>1. <math>AB = EO</math> ... (Opp sides of parm ABOE are equal)                  2. <math>AO = ED</math> ... (Opp sides of parm AODE are equal)                  3. <math>BO = DO</math> ... (Diagonals of parm BCDE bisect each other)</p> <p><math>\therefore \Delta ABO \equiv \Delta EOD</math> (S, S, S)</p>	<p>✓ <math>AB = EO</math>                  ✓ <math>AO = ED</math>                  ✓ reason – opp sides are equal                  ✓ <math>BO = DO</math>                  ✓ reason – diagonals of parm                  (5)                  [13]</p>

**TOTAL: 100**

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1.1)  $60 \leq x < 65$  ✓ (2)

1.2) 62,5 ✓ (1)

x	f(x)
42,5	85
47,5	237,5
52,5	525
57,5	1035
62,5	1750
67,5	1485
72,5	797,5
77,5	310

$\bar{x} = \frac{\sum f(x)}{100} = \frac{6225}{100} = 62,25$  ✓ (5)

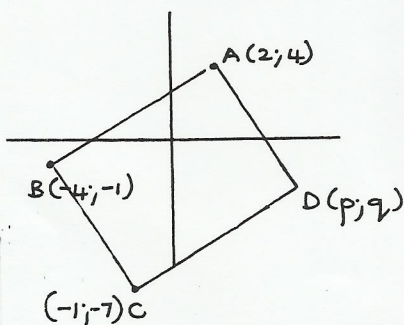
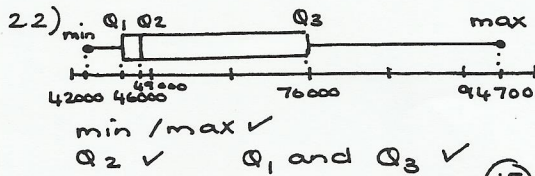
2.1) min = 42 000

$Q_1 = 46 000$  ✓

$Q_2 = 49 000$  ✓

$Q_3 = 70 000$  ✓ (for min and max)

max = 94 700 ✓ (4)



3.1)  $1 - \cos^2 \theta = 1 - \left(\frac{-5}{13}\right)^2 = 1 - \frac{25}{169} = \frac{144}{169}$  ✓ (3)

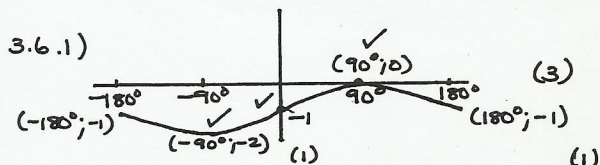
3.2)  $\frac{1}{2} \cdot 1 - \frac{1}{2} = 0$  ✓ (4)

3.3.1)  $2x = 41,409 \dots$  ✓  
 $\therefore x = 20,7^\circ$  ✓ (2)

3.3.2)  $x + 40^\circ = 78,69 \dots$  ✓  
 $\therefore x = 38,69^\circ$  ✓ (2)

3.4) 3,65 ✓ (2)

3.5)  $\frac{\sin x}{-\cos x} = -\tan x$  ✓ (3)



3.6.2)  $-2 \leq y \leq 0$  ✓ 3.6.3)  $360^\circ$  ✓ (21)

2.1)  $AC = \sqrt{(2+1)^2 + (4+7)^2} = 11,40$  ✓ (2)

2.2)  $p = 5$ ;  $q = -2$  ✓ (2)

2.3)  $m_{AB} = \frac{4+1}{2+4} = \frac{5}{6}$  ✓  
 $m_{BC} = \frac{-1+7}{-4+1} = -2$  ✓

$\therefore m_{AB} \cdot m_{BC} \neq -1$   
 $\therefore \hat{ABC} \neq 90^\circ$  ✓ (5)

2.4.1)  $J = \left(\frac{-4+2}{2}, \frac{-1+4}{2}\right) = \left(-1, \frac{3}{2}\right)$  ✓  
 $K = \left(\frac{-1+2}{2}, \frac{-7+4}{2}\right) = \left(\frac{1}{2}, -\frac{3}{2}\right)$  ✓ (4)

2.4.2)  $m_{JK} = \frac{3/2 + 3/2}{-1 - 1/2} = -2$  ✓  
 $m_{BC} = \frac{-1+7}{-4+1} = -2$  ✓

$\therefore m_{JK} = m_{BC}$  ✓  
 $\therefore JK \parallel BC$  ✓ (16)

4.1)  $\hat{A}OB = 90^\circ$  (diags bisect at  $90^\circ$ ) (2)  
 4.2) diags bisect one another (1)  
 4.3)  $\frac{AO}{10} = \sin 25^\circ$   
 $\therefore AO = 10 \times \sin 25^\circ$   
 $= 4,226\dots$   
 $\therefore AC = 8,45$  (4)

(7)

5.1.1)  $PS$  (adj. sides in kite =) (2)  
 5.1.2)  $MS$  (long diag bisects shdiag) (2)  
 or 5.1.3)  $\hat{PMS} = 90^\circ$  (long diag bisects short diagonal at  $90^\circ$ ) (2)  
 5.2)  $\frac{6}{10} = \cos \hat{PSM}$   
 $\therefore \hat{PSM} = 53,13^\circ$  (3)

(9)

6)  $\frac{AB}{28} = \sin 35^\circ$   
 $\therefore AB = 28 \cdot \sin 35^\circ$   
 $= 16,06 \text{ m} \approx 16 \text{ m}$   
 $AB = EC$   
 $\frac{DE}{40} = \sin 66^\circ$   
 $\therefore DE = 40 \cdot \sin 66^\circ$   
 $= 36,54 \approx 37 \text{ m}$   
 $\therefore DC = 36,54 + 16,06$   
 $= 52,60 \text{ m} \approx 53 \text{ m}$  (7)

(7)

7.1)  $V = \pi r^2 H + \frac{1}{2} \left( \frac{4}{3} \pi r^3 \right) + \frac{1}{3} \pi r^2 h$   
 $= \pi \cdot 9^2 \cdot 40 + \frac{2}{3} \pi \cdot 9^3 + \frac{1}{3} \pi \cdot 9^2 \cdot 12$   
 $= 12723,45 \text{ cm}^3$  (4)

7.2)  $TSA = \pi \cdot d \cdot H + \frac{1}{2} p \cdot slh + 2\pi r^2$   
 $= \pi \cdot 18 \cdot 40 + \frac{1}{2} \pi \cdot 18 \cdot 15 + 2\pi \cdot 9^2$   
 $= 3195 \text{ cm}^2$  (6)

\*  $(slh)^2 = 12^2 + 9^2$  (pyth)  
 $\therefore slh = 15$  (6)

8) In  $\Delta$ 's  $PTQ$  and  $RUS$   
 1.)  $\hat{PTQ} = \hat{SUR}$  (given)  
 2)  $PQ = SR$  (opp sides parm =)  
 3)  $P_2 = R_1$  (alt  $\angle$ 's = ;  
 $PQ \parallel SR$  in parm)  
 $\therefore \Delta PTQ \equiv \Delta RUS$  (LLS)

(5)

9) 9.1.1)  $2x + 2y = 180^\circ$   
 (co-int  $\angle$ 's =  $180^\circ$ ;  $AB \parallel CD$ )  
 $\therefore x + y = 90^\circ$   
 $\therefore \hat{AED} = 90^\circ$  (sum  $\angle$ 's  $\Delta = 180^\circ$ ) (3)  
 9.1.2)  $\hat{AEB} = x$  (alt  $\angle$ 's = ;  
 $AD \parallel BC$ )

$\therefore \hat{BAE} = \hat{AEB}$   
 $\therefore \Delta ABE$  is isos (2)

9.1.3)  $AB = BE$  (isos  $\Delta$ )  
 but  $AB = DC$  (opp sides parm =)  
 $\hat{DEC} = y$  (alt  $\angle$ 's = ;  $AD \parallel BC$ )  
 $\therefore \Delta DEC$  is isos  
 $\therefore DC = EC$   
 $\therefore EC = AB$  (4)

9.2)  $AB = \frac{1}{2} BC$   
 or  $BC = 2AB$  (1)

(10)

1.1.1)  $m_{AB} = \frac{6-2}{1+5} = \frac{2}{3}$  ✓  
 $m_{DC} = \frac{1+3}{2+4} = \frac{2}{3}$  ✓ (4)

1.1.2)  $AB = \sqrt{(-5-1)^2 + (2-6)^2}$  ✓  
 $= 2\sqrt{13}$  ✓ = 7,21 ✓  
 $DC = \sqrt{(-4-2)^2 + (-3-1)^2}$  ✓  
 $= 2\sqrt{13}$  ✓ = 7,21 ✓ (6)

1.2.1) Both prs opp. sides = ✓  
 Both prs opp sides || ✓  
 1 Pr opp. sides || and = ✓ (3)

1.2.2)  $m_{AB} = m_{DC} \therefore AB \parallel DC$  ✓  
 $AB = DC$  (proven) ✓  
 $\therefore ABCD$  is a parm (one pr. opp sides || and =) ✓ (3)

1.3.1)  $M = \left( \frac{-5+2}{2}, \frac{2+1}{2} \right)$  ✓  
 $= \left( -\frac{3}{2}, \frac{3}{2} \right)$  ✓ (3)

1.3.2) Mdpt BD =  $\left( \frac{-4+1}{2}, \frac{-3+6}{2} \right)$  ✓  
 $= \left( -\frac{3}{2}, \frac{3}{2} \right)$  ✓  
 $\therefore M =$  Mdpt BD  
 $\therefore$  Diags bisect. ✓ (4)

2.2) • diags bisect one another ✓  
 • diags bisect at  $90^\circ$  ✓  
 • diags bisect  $\angle$ 's into which they run ✓ (3)

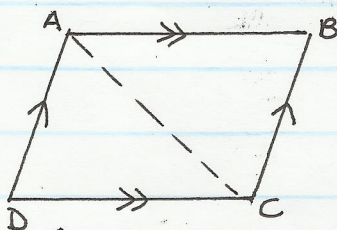
2.3.1)  $PS = SR$  (adj. sides =) ✓  
 $\therefore 2x = 50^\circ$  (base  $\angle$ 's isos  $\Delta$ ) ✓  
 $\therefore x = 25^\circ$  ✓ (4)

2.3.2)  $\hat{QOR} = 90^\circ$  (diags  $\perp$ ) ✓  
 $\hat{QRO} = 50^\circ$  (diags bisect  $\angle$ 's) ✓  
 $\therefore \frac{QR}{10} = \text{cosec } 50^\circ$  (diags bisect) ✓  
 $\therefore QR = 10 \times \frac{1}{\sin 50^\circ}$  ✓  
 $= 13,05 \text{ cm}$  ✓ (5)

2.3.3)  $PO = OR$  (diags bisect) ✓  
 $\therefore MO = \frac{1}{2} QR$  (mdpt theorem) ✓  
 $\therefore MO = 6,53 \text{ cm}$  ✓ (3)

2.4) Let  $A_1 = A_2 = x$  and  $B_1 = B_2 = y$   
 $\therefore 2x + 2y = 180^\circ$  (co-int  $\angle$ 's  $AD \parallel BC$ ) ✓  
 $\therefore x + y = 90^\circ$  ✓ (5)  
 $\therefore \hat{AEB} = 90^\circ$  (sum  $\angle$ 's  $\Delta = 180^\circ$ ) ✓

2.1)



Given: parm ABCD with  $AB \parallel DC$  and  $AD \parallel BC$  (as in pupil's drawing)

Constr: AC

RTP:  $AB = DC$  and  $AD = BC$

Proof: In  $\Delta$ 's ADC and CBA

1.  $\hat{DAC} = \hat{ACB}$  (alt  $\angle$ 's  $AD \parallel BC$ ) ✓
2.  $\hat{ACD} = \hat{CAB}$  (alt  $\angle$ 's  $AB \parallel DC$ ) ✓
3.  $AC = AC$  (common) ✓

$\therefore \Delta ADC \equiv \Delta CBA$  (LLS) ✓

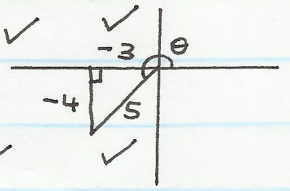
$\therefore AD = BC$  and  $AB = DC$  (proven) ✓ (5)

3.1)  $V = 1500 \times 2 = 3000 \text{ cm}^3$  (2)

3.2)  $TSA = \pi r^2 + \pi d \times h$   
 $+ \frac{1}{2} ph$   
 $TSA = \pi(5)^2 + \pi(10)(6) + \frac{1}{2}(\pi \cdot 10)13$   
 $= 471,24 \text{ cm}^2$  ✓ (5)

4.1) 1,48 ✓ (2)

4.2)  $\sin \theta = \frac{-4}{5}$  ✓  
 $5 \cos \theta - 3 \sec \theta$   
 $= 5 \left( \frac{-3}{5} \right) - 3 \left( \frac{5}{-3} \right)$   
 $= -3 + 5 = 2$  ✓ (6)



$$4.3) \left(\frac{1}{2}\right)^2 \cdot \left(\frac{1}{1}\right) \cdot \left(\frac{1}{2}\right) \\ = \left(\frac{1}{4}\right)\left(\frac{1}{2}\right) = \frac{1}{8} \checkmark (4)$$

$$4.4.1) \cos(x - 10^\circ) = 0,766 \checkmark$$

$$\therefore x - 10^\circ = 40^\circ \checkmark$$

$$\therefore x = 50^\circ \checkmark (3)$$

$$4.4.2) 3 \tan 5x = 5 \checkmark$$

$$\therefore \tan 5x = \frac{5}{3} \checkmark$$

$$\therefore 5x = 59,036 \checkmark$$

$$\therefore x = 11,81^\circ \checkmark (4)$$

$$4.5.1) \sin \hat{D} = \frac{10}{26} \checkmark$$

$$\therefore \hat{D} = 22,62^\circ \checkmark (3)$$

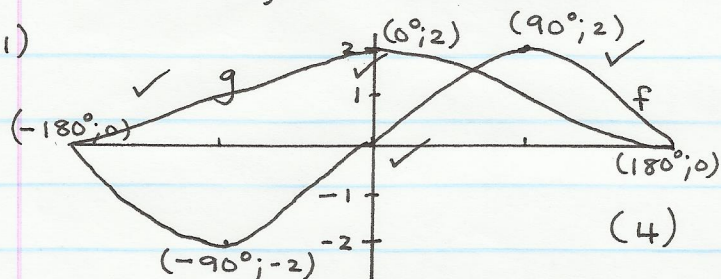
$$4.5.2) \hat{B} = 67,38^\circ \text{ (sum of } \Delta = 180^\circ) \checkmark$$

$$\therefore \frac{BC}{10} = \cot 67,38^\circ \checkmark$$

$$\therefore BC = \frac{10}{\tan 67,38^\circ} \checkmark$$

$$= 4,17 \text{ cm } \checkmark (4)$$

4.6.1)



(4)

$$4.6.2) 360^\circ \checkmark (1)$$

5.1)

0	3;6
1	0;0;1;1;3;8
2	1;5;7;9 $\checkmark (2)$
3	2;3;5
4	2;2;7;9;9

5.4)

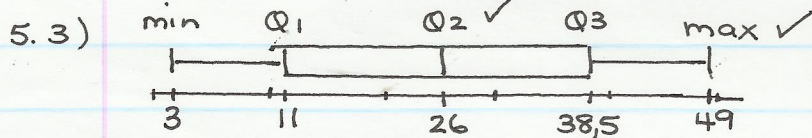
Interval	Freq
0-9	2
10-19	6
20-29	4 $\checkmark$
30-39	3 (1)
40-49	5

$$5.2) Q_2 = \frac{25+27}{2} = 26 \checkmark$$

$$Q_1 = 11 \checkmark \quad Q_3 = \frac{35+42}{2} = 38,5 \checkmark$$

$$\therefore IQR = Q_3 - Q_1 \checkmark$$

$$= 27,5 \checkmark (5)$$



(3)

$$5.5) \text{Est } \bar{x} = \left[ 2(4,5) + (14,5) \times 6 + \right. \\ \left. (24,5) \times 4 + 34,5 \times 3 \right. \\ \left. + 44,5 \times 5 \right] \div 20$$

$$= \frac{520}{20} \checkmark$$

$$= 26 \checkmark (3)$$

**NOTE:**

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- If a candidate crossed out an attempt of a question and did not redo the question, mark the crossed-out version.
- Consistent accuracy applies in ALL aspects of the marking memorandum. Stop marking at the second calculation error.
- Assuming answers/values in order to solve a problem is NOT acceptable.

**LET WEL:**

- Indien 'n kandidaat 'n vraag TWEE KEER beantwoord, sien slegs die EERSTE poging na.
- Indien 'n kandidaat 'n antwoord doodgetrek het en nie oorgedoen het nie, sien die doodgetrekte poging na.
- Volgehoue akkuraatheid word in ALLE aspekte van die memorandum toegepas. Hou op nasien by die tweede berekeningsfout.

Om antwoorde/waardes om 'n probleem op te los, te veronderstel, word NIE toegelaat NIE.

**QUESTION/VRAAG 1**

14	15	16	16	17	17	18	18	19	19
19	20	21	21	22	23	24	24	29	

1.1	Median/ <i>Mediaan</i> = 19 seconds/ <i>sekondes</i>	✓ answer/ <i>antw</i> (1)
1.2	Lower quartile/ <i>Onderste kwartiel</i> ( $Q_1$ ) = 17 Upper quartile/ <i>Boonste kwartiel</i> ( $Q_3$ ) = 22	✓ $Q_1$ ✓ $Q_3$ (2)
1.3		✓ box/ <i>mond</i> ✓ whiskers/ <i>snor</i> (2)
1.4.1	$IQR/IKO = 26 - 19$ $= 7$	✓ $Q_3 - Q_1$ ✓ answer/ <i>antw</i> (2)
1.4.2	75% of the boys took at least 19 seconds to complete the puzzle./ <i>75% van die seuns het ten minste 19 sekondes geneem om die legkaart te voltooi.</i>	✓ 75% (1)
1.5	About 50% but not more than 75% of the boys completed the puzzle in less than 23 seconds./ <i>Ongeveer 50% maar nie meer as 75% van die seuns het die legkaart in minder as 23 sekondes voltooi.</i> More than 75% of the girls completed the puzzle in less than 23 seconds./ <i>Meer as 75% van die dogters het die legkaart in minder as 23 sekondes voltooi.</i> Therefore more girls completed the puzzle in less than 23 seconds./ <i>Meer dogters het dus die legkaart in minder as 23 sekondes voltooi.</i>	✓ relevant/ <i>relevante</i> explanation/ <i>verduideliking</i>  ✓ girls/ <i>dogters</i> (2)

**[10]**

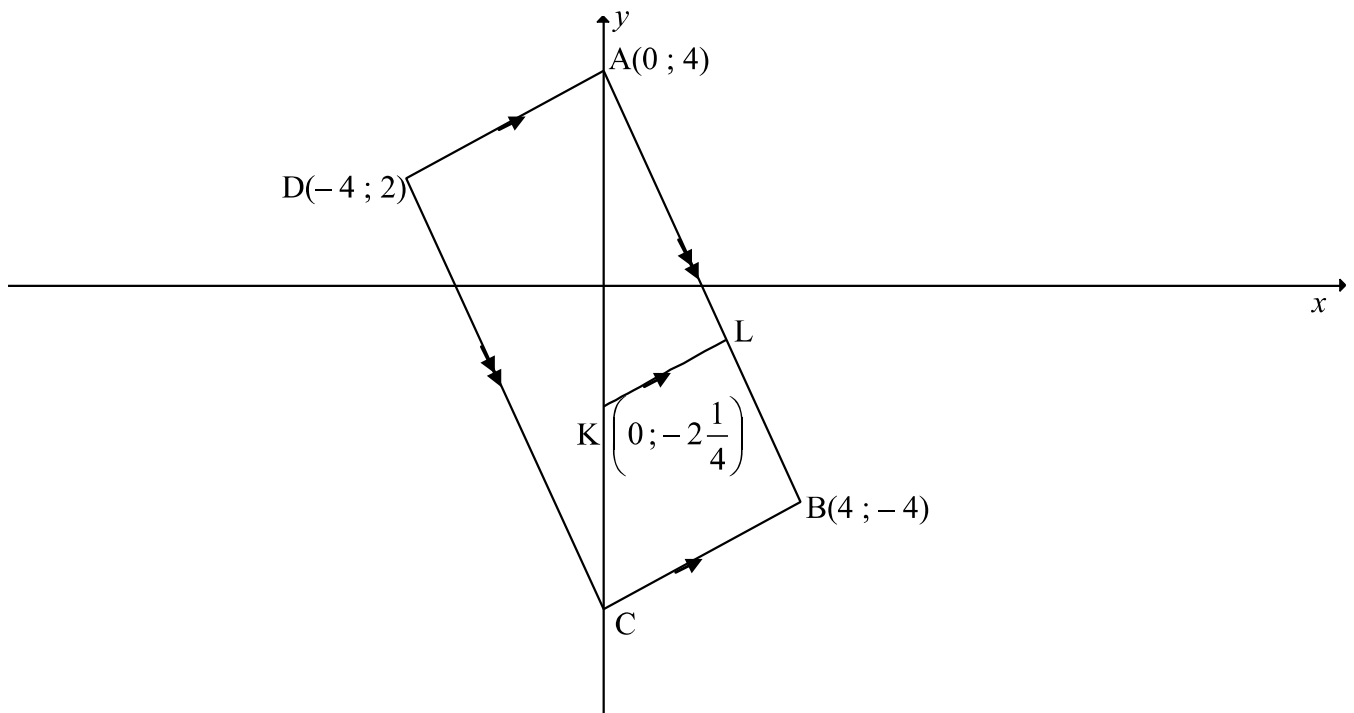


## QUESTION/VRAAG 2

NUMBER OF HOURS <i>GETAL UUR (h)</i>	FREQUENCY <i>FREKWENSIE</i>
$0 < h \leq 2$	10
$2 < h \leq 4$	15
$4 < h \leq 6$	30
$6 < h \leq 8$	35
$8 < h \leq 10$	25
$10 < h \leq 12$	5

2.1	The modal class is/ <i>Die modale klas is</i> $6 < h \leq 8$	✓ $6 < h \leq 8$ (1)
2.2	<p>Average/<i>Gemiddelde</i> = <math>\frac{1 \times 10 + 3 \times 15 + \dots + 11 \times 5}{120}</math></p> <p>Estimated mean/<i>Geskatte gemiddelde</i> (<math>\bar{x}</math>) = <math>\frac{730}{120}</math> = 6,08 hours/<i>uur</i></p>	<p>✓ midpts/<i>midpte</i></p> <p>✓ 730</p> <p>✓ answer/<i>antw</i> (3) [4]</p>

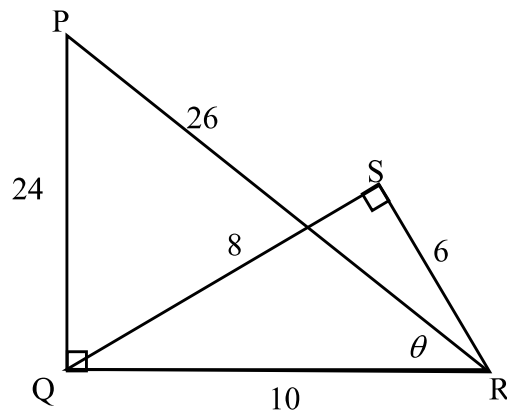
**QUESTION/VRAAG 3**



<p>3.1</p>	$DB = \sqrt{(x_1 - x_2)^2 + (y_1 - y_2)^2}$ $= \sqrt{(-4 - 4)^2 + (2 - (-4))^2}$ $= \sqrt{64 + 36}$ $= \sqrt{100}$ $= 10$	<p>✓ correct formula/ korrekte formule ✓ subst  ✓ answer/antw (3)</p>
<p>3.2</p>	$M\left(\frac{x_1 + x_2}{2} ; \frac{y_1 + y_2}{2}\right)$ $M\left(\frac{-4 + 4}{2} ; \frac{2 - 4}{2}\right)$ $\therefore M(0 ; -1)$	<p>✓ correct formula/ korrekte formule  ✓ x-value/waarde ✓ y-value/waarde (3)</p>
<p>3.3</p>	$m_{AD} = \frac{y_1 - y_2}{x_1 - x_2}$ $= \frac{4 - 2}{0 - (-4)}$ $= \frac{2}{4} = \frac{1}{2}$	<p>✓ correct formula/ korrekte formule ✓ subst into/in gradient form/ gradiëntvorm  ✓ answer/antw (3)</p>

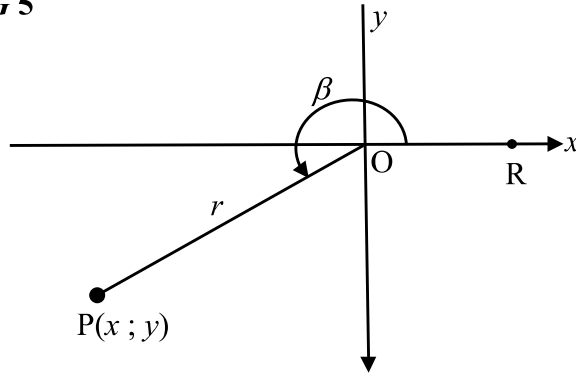
3.4	$m_{AB} = \frac{y_1 - y_2}{x_1 - x_2}$ $= \frac{4 - (-4)}{0 - 4}$ $= \frac{8}{-4} = -2$ $\therefore m_{AD} \times m_{AB} = \frac{1}{2} \times -2 = -1$ $\therefore AD \perp AB$	✓ subst ✓ gradient of AB/ <i>gradiënt van AB</i> ✓ $m_{AD} \times m_{AB}$ $= -1$ (3)
3.5	parallelogram with one internal angle = $90^\circ$ <i>parallelogram met een binnehoek = <math>90^\circ</math></i>	✓ R (1)
3.6	$m_{KL} = m_{AD} = \frac{1}{2}$ [KL    AD] $\therefore y = \frac{1}{2}x - 2\frac{1}{4}$	✓ gradient of KL <i>gradiënt van KL</i> ✓ equation/vgl (2)
3.7	AC = DB = 10 units [diag of rectangle = <i>hkle v regh</i> =] $4 - y_C = 10$ $y_C = -6$ $\therefore C(0 ; -6)$ <b>OR/OF</b> $m_{BC} = m_{AD} = \frac{1}{2}$ [sides of rectangle   <i>/sye v regh</i>   ] $\frac{-4 - y_C}{4 - 0} = \frac{1}{2}$ $-8 - 2y_C = 4$ $y_C = -6$ $\therefore C(0 ; -6)$	✓ R ✓ equation/vgl ✓ answer/ <i>antw</i> (3) ✓ R ✓ equation/vgl ✓ answer/ <i>antw</i> (3)
		[18]

**QUESTION/VRAAG 4**



4.1.1	$\tan \hat{P} = \frac{10}{24} = \frac{5}{12}$	Accept answers as unsimplified fractions.	✓ answer/antw (1)
4.1.2	$\sin \hat{SQR} = \frac{6}{10} = \frac{3}{5}$		✓ answer/antw (1)
4.1.3	$\cos \theta = \frac{10}{26} = \frac{5}{13}$	Aanvaar antwoorde as nie-vereenvoudigde breuke.	✓ answer/antw (1)
4.1.4	$\sec \hat{SRQ} = \frac{10}{6} = \frac{5}{3}$		✓ answer/antw (1)
4.2	$\frac{\cot \theta}{\operatorname{cosec} \hat{QRS}}$ $= \frac{10}{24} \div \frac{10}{8}$ $= \frac{1}{3}$		$\sqrt{\frac{10}{24}} \sqrt{\frac{10}{8}}$ $\sqrt{\frac{1}{3}}$ (3) [7]

**QUESTION/VRAAG 5**



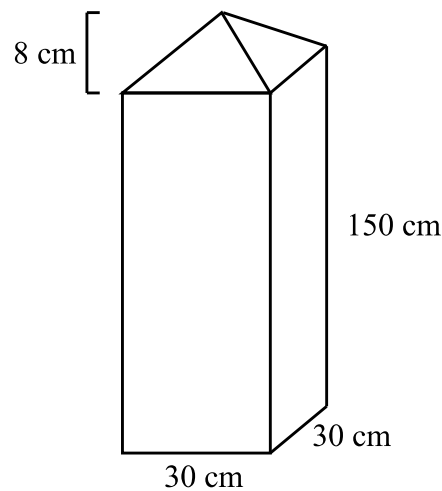
5.1.1	$x = -15$ $r = 17$ $x^2 + y^2 = r^2$ $(-15)^2 + y^2 = 17^2$ $y^2 = 64$ $y = -8$	✓ <i>x</i> -value/waarde ✓ <i>r</i> -value/waarde  ✓ using/gebruik Pyth  ✓ <i>y</i> -value/waarde (4)
5.1.2(a)	$\sin \beta = -\frac{8}{17}$	✓ answer/antw (1)
5.1.2(b)	$\cos^2 30^\circ \cdot \tan \beta$ $= \left(\frac{\sqrt{3}}{2}\right)^2 \cdot \frac{-8}{-15}$ $= \frac{3}{4} \times \frac{8}{15}$ $= \frac{2}{5}$	✓ $\frac{\sqrt{3}}{2}$ ✓ $\frac{-8}{-15}$  ✓ answer/antw (3)
5.1.3	$\hat{R\hat{O}P} = 180^\circ + 28,07^\circ$ $= 208,07^\circ$	✓ ref/verw $\angle$ ✓ answer/antw (2)
5.2.1	$\tan x = 2,22$ $x = 65,75^\circ$	✓✓ answer/antw (2)
5.2.2	$\sec(x + 10^\circ) = 5,759$ $\cos(x + 10^\circ) = 0,173\dots$ <b>OR/OF</b> $\cos(x + 10^\circ) = \frac{1}{5,759}$ $x + 10^\circ = 80,0^\circ$ $x = 70,0^\circ$	✓ $\cos(x + 10^\circ) = \frac{1}{5,759}$  ✓ ref/verw $\angle$ ✓ answer/antw (3)
5.2.3	$\frac{\sin x}{0,2} - 2 = 1,24$ $\frac{\sin x}{0,2} = 3,24$ $\sin x = 0,648$ $x = 40,39^\circ$	✓ addition/optelling  ✓ multipl/vermenigv ✓ answer/antw (3)

[18]

## QUESTION/VRAAG 6

6.1	amplitude = 2	✓ answer/antw (1)
6.2	min value/waarde = $-2 + 3 = 1$	✓ answer/antw (1)
6.3		✓ y-intercept/afsnit ✓ $(90^\circ ; 2)$ ✓ $(270^\circ ; 0)$ (3)
6.4.1	$f(180^\circ) - g(180^\circ)$ $= 2 - 1$ $= 1$	✓ correct values/ korrekte waardes ✓ answer/antw (2)
6.4.2	$x \in (90^\circ ; 270^\circ)$ <b>OR/OR</b> $90^\circ < x < 270^\circ$	✓ correct values/ korrekte waardes ✓ notation/notasie (2)
6.5.1	$f(x) = 2 \cos x - 3$	✓✓ answer/antw (2)
6.5.2	$y \in [-5 ; -1]$ <b>OR/OR</b> $-5 \leq y \leq -1$	✓✓ answer/antw (2)
		<b>[13]</b>

## QUESTION/VRAAG 7

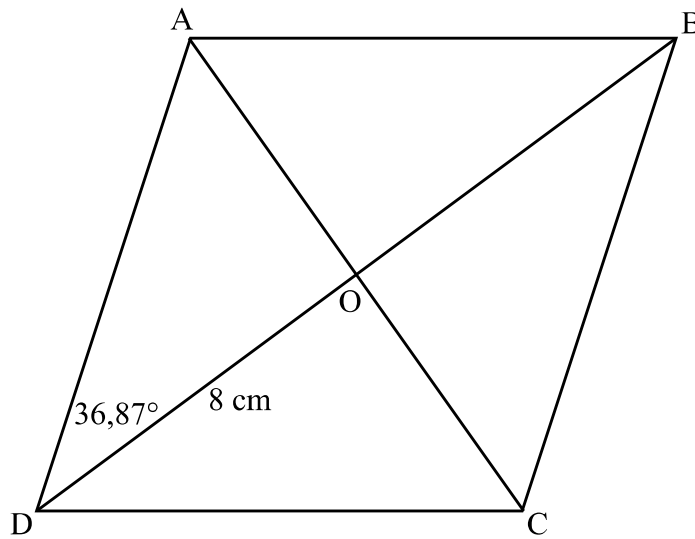


7.1	<p>Vol of post = vol of rectangle + vol of pyramid  <math>= \text{area of base} \times h + \frac{1}{3} \text{ area of base} \times h</math>  <i>Vol van pilaar = vol v reghoek + vol v piramide</i>  <math>= \text{oppervl v basis} \times h + \frac{1}{3} \text{ oppervl v basis} \times h</math></p> <p>Volume = <math>(30 \times 30 \times 150) + \left(\frac{1}{3}(30 \times 30 \times 8)\right)</math>  <math>= 137\,400 \text{ cm}^3</math></p>	<p>✓ sum of formulae/  <i>som v formules</i></p> <p>✓ subst into/in  <i>both/beide</i>  <i>formulae</i></p> <p>✓ answer/antw            (3)</p>
7.2	<p>Slant height of pyramid/<i>Skuinshoogte van piramide</i>  <math>= \sqrt{8^2 + 15^2}</math>  <math>= 17</math></p> <p>Total surface area of pyramid = area of base + <math>\frac{1}{2}</math> (perimeter of            base <math>\times</math> slant height)</p> <p>Surface area of pyramid section = <math>4 \times \left(\frac{1}{2} \times 30 \times 17\right)</math>  <math>= 1020 \text{ cm}^2</math></p> <p>Totale buite-oppervlakte van 'n piramide  <math>= \text{oppervl v basis} + \frac{1}{2} (\text{omtrek v die basis} \times \text{skuinshoogte})</math></p> <p>Surface area of pyramid section/<i>Buite-opp van piramide gedeelte</i>  <math>= 4 \times \left(\frac{1}{2} \times 30 \times 17\right)</math>  <math>= 1020 \text{ cm}^2</math></p>	<p>✓ 17</p> <p>✓ subst into/in  <i>correct/korrekte</i>  <i>form</i></p> <p>✓ answer/antw            (3)</p>

7.3	<p> <math display="block">\text{Volume (new)} = \frac{1}{4}(137400)</math> <math display="block">= 34350 \text{ cm}^3</math> </p> <p> <math display="block">\text{Number of smaller posts that can be made} = \frac{137400}{34350}</math> <math display="block">= 4</math> </p> <p> <math display="block">\text{Volume (nuwe)} = \frac{1}{4}(137400)</math> <math display="block">= 34350 \text{ cm}^3</math> </p> <p> <math display="block">\text{Getal kleiner pilare wat gemaak kan word} = \frac{137400}{34350}</math> <math display="block">= 4</math> </p> <p style="text-align: center;"><b>OR/OF</b></p> <p> <math display="block">\text{Volume (nuwe)} = (15 \times 15 \times 150) + \left( \frac{1}{3}(15 \times 15 \times 8) \right)</math> <math display="block">= 34350 \text{ cm}^3</math> </p> <p> <math display="block">\text{Getal kleiner pilare wat gemaak kan word} = \frac{137400}{34350}</math> <math display="block">= 4</math> </p> <p> <math display="block">\text{Volume (new)} = (15 \times 15 \times 150) + \left( \frac{1}{3}(15 \times 15 \times 8) \right)</math> <math display="block">= 34350 \text{ cm}^3</math> </p> <p> <math display="block">\text{Getal kleiner pilare wat gemaak kan word} = \frac{137400}{34350}</math> <math display="block">= 4</math> </p>	<p>✓ 34 350</p> <p>✓ 4</p> <p style="text-align: right;">(2)</p> <p>✓ 34 350</p> <p>✓ 4</p> <p style="text-align: right;">(2)</p> <p style="text-align: right;"><b>[8]</b></p>
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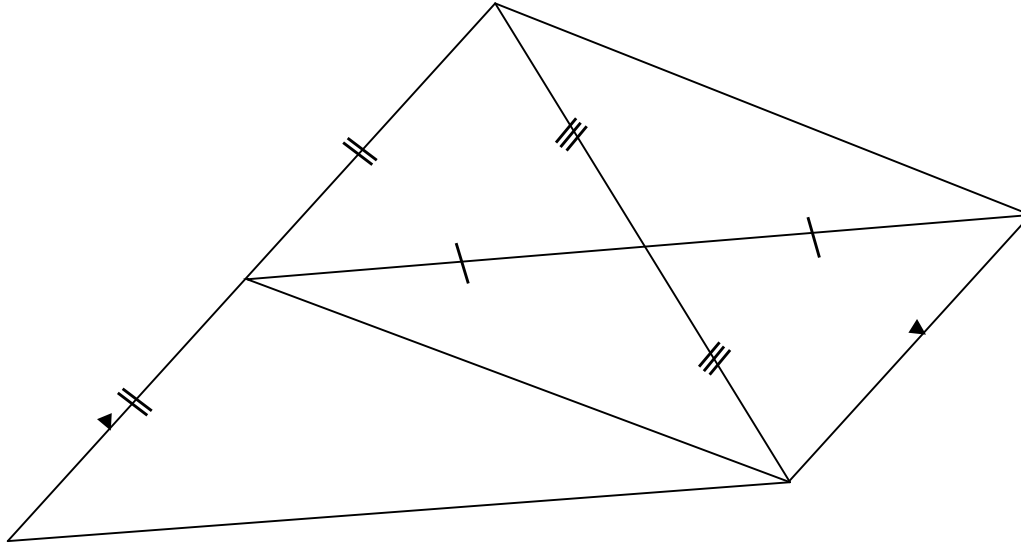
QUESTION/VRAAG 8



8.1.1	$\hat{CDO} = 36,87^\circ$	✓ answer/antw (1)
8.1.2	$\hat{AOD} = 90^\circ$	✓ answer/antw (1)
8.2	$\tan 36,87^\circ = \frac{AO}{8}$ $AO = 8 \times \tan 36,87^\circ$ $= 6 \text{ cm}$	✓ $\tan 36,87^\circ = \frac{AO}{8}$  ✓ answer/antw (2)
8.3	$AD^2 = 8^2 + 6^2$ $= 100$ $AD = 10$ <p>[Theorem of Pythagoras/se stelling]</p> $AE = EB$ <p>[converse midpoint theorem/omgekeerde midptst]</p> $OE = \frac{1}{2} AD = 5 \text{ cm}$ <p>[midpoint theorem/midptst]</p>	✓ AD = 10 with reason/met rede  ✓S ✓R ✓ 5 cm  (4) <b>[8]</b>

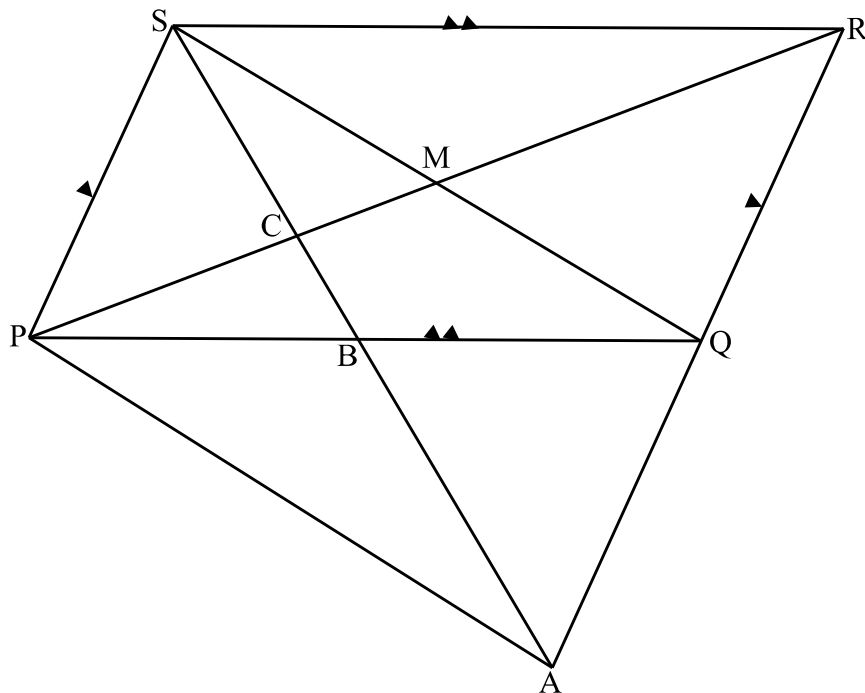
**QUESTION/VRAAG 9**

9.1



9.1.1	Two sides and an included angle/ <i>Twee sye en 'n ingeslote hoek</i>	✓ R (1)
9.1.2	one pr of sides = and    <i>een pr sye = en   </i>	✓ R (1)
9.1.3	$DE = \frac{1}{2} DF$ [DE = EF] $DF = BC$ [opp sides of parm/ <i>tos sye v parm =</i> ] $\therefore DE = \frac{1}{2} BC$	✓ S ✓ S (2)

9.2



9.2.1	In $\triangle SAR$ , $SB = BA$ [given/gegee] $QR = QA$ [converse midpoint th/omgekeerde midptst] But/maar $QR = SP$ [opp sides of parm =/tos sye v parm=] $\therefore SP = QA$	$\checkmark S \checkmark R$ $\checkmark S \checkmark R$ (4)
9.2.2	$SP = QA$ [proven/bewys] $SP \parallel QA$ [opp sides of parm   /tos sye v parm   ] $\therefore SPAQ$ is a parm [one pr of sides = and   /een pr sye = en   ]	$\checkmark$ both statements/ beide bewerings $\checkmark R$ (2)
9.2.3	M midpoint of/midpt van PR and/en B midpoint of/midpt van PQ [diag bisect of parm/hkle halveer parm]  $MB = \frac{1}{2}QR$ [midpoint theorem/midptst]  $MB = \frac{1}{2}\left(\frac{1}{2}AR\right)$ $\therefore 4MB = AR$	$\checkmark S$  $\checkmark S \checkmark R$  $\checkmark QR = \frac{1}{2}AR$  (4)
		<b>[14]</b>

**TOTAL/TOTAL: 100**

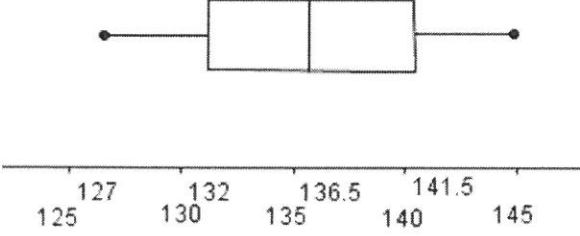
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- Assuming values/answers in order to solve a problem is unacceptable.

**LET WEL:**

- As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.
- Volgehoue akkuraatheid is op ALLE aspekte van die memorandum van toepassing.
- Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.

**QUESTION 1/VRAAG 1**

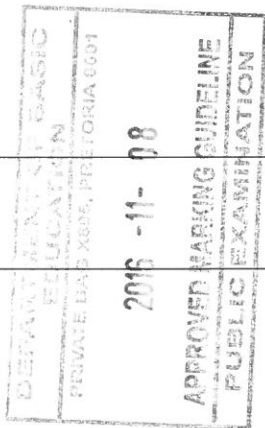
1.1	$\text{Median/Mediaan} = \frac{136+137}{2}$ $= 136,5$	✓ answer/antwoord (1)
1.2.1	$\text{Mean/Gemiddelde} = \frac{2728}{20}$ $= 136,4 \text{ cm}$	✓ 2728 ✓ answer/antwoord Answer only/ slegs antw 2/2 (2)
1.2.2	$\text{Range/Variasiewydte} = 145 - 127$ $= 18 \text{ cm}$	✓ answer/antwoord (1)
1.2.3	$\text{Lower quartile/Onderste kwartiel} = 132$ $\text{Upper quartile/Boonste kwartiel} = 141 \frac{1}{2}$ $\text{Interquartile range/IKO} = 141 \frac{1}{2} - 132$ $= 9,5 \text{ cm}$	✓ Lower quartile/Onderste kwartiel ✓ Upper quartile/Boonste kwartiel ✓ answer/antwoord Answer only full marks Slegs antw volpunte (3)
1.3		✓ median/min/max/ mediaan/min/maks ✓ Q <sub>1</sub> and/ en Q <sub>3</sub> CA from 1.1 & 1.2.3 VA vanaf 1.1 & 1.2.3 (2)

DEPARTMENT OF BASIC EDUCATION  
 REPUBLIC OF SOUTH AFRICA  
 2016 -11- 08  
 APPROVED MARKING GUIDELINE  
 PUBLIC EXAMINATION



**QUESTION 2/VRAAG 2**

<p>2.1</p>	<p>Modal class(<i>Module klas</i>)</p> $100 \leq x < 110$	<p>✓ answer/<i>antwoord</i> Do not penalise notation <i>Notasie word nie gepenaliseer nie</i></p> <p>(1)</p>
<p>2.2</p>	$110 \leq x < 120$	<p>✓✓ answer/<i>antwoord</i> Note: if learner identifies position of median only: 1/2 <i>Nota: Indien leerder slegs posisie van mediaan bepaal: 1/2</i></p> <p>(2)</p>
<p>2.3</p>	<p>Estimate Mean IQ of students/<i>Geskatte gemiddelde IK</i></p> $= \frac{3480}{30}$ $= 116$	<p>✓ 3480 ✓ 30</p> <p>✓ answer/<i>antwoord</i> CA on numerator only <i>VA slegs vir teller</i> Answer only/ <i>Slegs antw 3/3</i></p> <p>(3) <b>[6]</b></p>

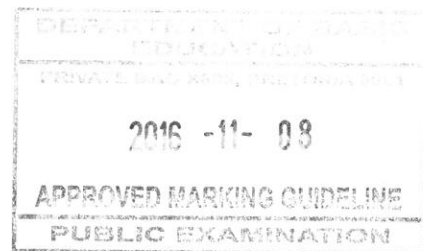


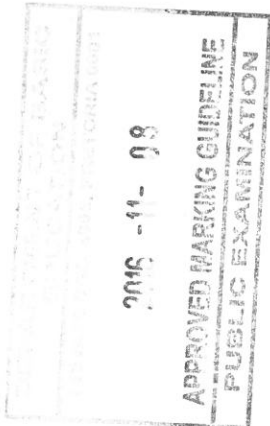
**QUESTION 3/VRAAG 3**

<p>3.1</p>	$AB = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(3 - 1)^2 + (6 - 1)^2}$ $= \sqrt{29}$ $AC = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(6 - 1)^2 + (3 - 1)^2}$ $= \sqrt{29}$ <p>AB = AC ∴ ΔABC is isosceles/<i>gelykbenig</i></p>	<p>✓ corr. subst. in corr. formula/<i>vervang in korrekte formule</i> ✓ distance/<i>afstand</i> AB</p> <p>✓ subst. in corr. formula/<i>vervang in korrekte formule</i></p> <p>✓ AB = AC or / of ΔABC is isosceles / <i>gelykbenig</i></p> <p>Wrong formula 0/4 marks <i>Verkeerde formule 0/4</i></p> <p>(4)</p>
<p>3.2.1</p>	<p>AD is parallel to the x-axis/<i>AD parallel aan x-as</i> ∴ A and D have the same y-coordinates/<i>A en D het dieselfde</i></p>	

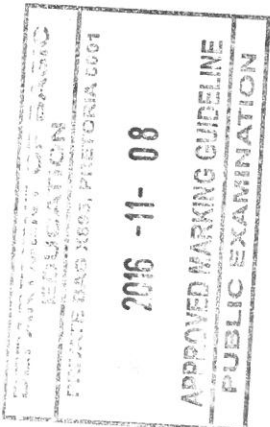


<p><i>y</i>-koördinate          But / <i>maar</i> <math>AD = 5</math> units/<i>eenhede</i>  <math>\therefore D(8 ; 5)</math>          CD is perpendicular to the <i>x</i>-axis/<i>CD is loodreg op x-as</i></p> <p><math>\therefore</math> C and D have the same <i>x</i>-coordinate/<i>C en D het dieselfde x-koördinate</i>          But C lies on the <i>x</i>-axis./<i>C lê op die x-as</i>  <math>\therefore C(8 ; 0)</math>  <b>Or any other valid explanation / of enige ander geldige rede</b></p>	<p>✓ explaining <i>x</i>-coordinate/  <i>x-koördinaat verduidelik</i></p> <p>✓ explaining <i>y</i>-coordinate/  <i>y-koördinaat verduidelik</i> (2)</p>
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<p>3.2.2</p>	<p>P is midpoint of AC the diagonals of the kite/  <i>P is middelpunt van AC, die hoeklyne van die vlieër</i></p> $\therefore P \left( \frac{3+8}{2} ; \frac{5+0}{2} \right)$ $P \left( \frac{11}{2} ; \frac{5}{2} \right)$	<p>✓ x-value/waarde                  ✓ y-value/waarde</p> <p>(2)</p>
<p>3.2.3.</p>	<p>B(-1 ; -4) D(8 ; 5)</p> $m_{BD} = \frac{5+4}{8+1}$ $= 1$	<p>✓ substitution/vervang                  ✓ answer/antwoord                  Answer only 2/2                  Slegs antw 2/2</p> <p>(2)</p>
<p>3.2.4</p>	<p>A(3 ; 5) &amp; C(8 ; 0)</p> $AC = \sqrt{(0 - 5)^2 + (8 - 3)^2}$ $= \sqrt{50} \text{ or/of } 5\sqrt{2} \text{ or/of } 7,07$	<p>✓ substitution/vervang                  ✓ answer/antwoord</p> <p>(2)</p>
<p>3.2.5</p>	<p>B(-1 ; -4) &amp; D(8 ; 5)</p> $BD = \sqrt{(5 + 4)^2 + (8 + 1)^2}$ $= \sqrt{162}$ $\text{Area} = \frac{1}{2} (BD \cdot AC)$ $= \frac{1}{2} (\sqrt{162} \cdot \sqrt{50})$ $= 45$ <p>OR / OF</p> <p>B(-1 ; -4) &amp; D(8 ; 5)</p> $BD = \sqrt{(5 + 4)^2 + (8 + 1)^2}$ $= \sqrt{162}$ <p>A(3 ; 5) &amp; P(5,5 ; 2,5)</p> $AP = \sqrt{(3 - 5,5)^2 + (5 - 2,5)^2}$ $= \frac{5\sqrt{2}}{2}$ <p>Area ADCB = area <math>\Delta ABD</math> + area <math>\Delta CBD</math></p> $= 2 (0,5 \times BD \times AP)$ $= 2 \left( \frac{1}{2} \times \sqrt{162} \times \frac{5\sqrt{2}}{2} \right)$ $= 45$	 <p>✓ length/lengte BD                  ✓ substitution in corr formula/ vervang in korr formule                  ✓ answer/antwoord correct area formula only 1/3                  slegs korrekte areaformule 1/3</p> <p>(3)</p> <p><b>OR/OF</b></p> <p>✓ length/lengte BD</p> <p>✓ length/lengte AP</p> <p>✓ answer/antwoord</p> <p>(3)                  [15]</p>

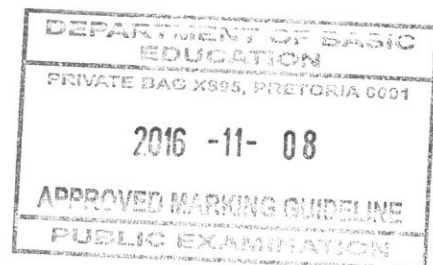
**QUESTION 4/VRAAG 4**

4.1.1(a)	$\frac{b}{c}$	✓ answer/antwoord (1)
4.1.1(b)	$\frac{a}{b}$	✓ answer/antwoord (1)
4.1.1(c)	$\frac{b}{c}$	✓✓ answer/antwoord 0 or / of 2 marks /punte (2)
4.1.2	$\tan\theta = \frac{a}{b}$ $\tan 50^\circ = \frac{5}{b}$ $\therefore b = \frac{5}{\tan 50^\circ}$ $b = 4,20$	✓ correct subst in ratio/ korr subst in verhouding  ✓ b value/waarde (penalise for rounding off only in this question) (afroning word slegs in hierdie vraag gepenaliseer) (2)
4.2	$2\operatorname{cosec} 38,2^\circ + \cos 3(146,4^\circ)$ $= 2\left(\frac{1}{\sin 38,2^\circ}\right) + \cos 3(146,4^\circ)$ $= 3,42$	✓ $\left(\frac{1}{\sin 38,2^\circ}\right)$ or/of 2(1,617) or/of 3,234  ✓✓ answer accurate/ antwoord akkuraat  [Answer only – full marks] [Slegs antwoord – volpunte] (3)
4.3	$\frac{\sin 45^\circ \cdot \tan^2 60^\circ}{\cos 45^\circ}$ $\frac{\left(\frac{1}{\sqrt{2}}\right)\left(\frac{\sqrt{3}}{1}\right)\left(\frac{\sqrt{3}}{1}\right)}{\frac{1}{\sqrt{2}}}$ $\frac{3}{\frac{\sqrt{2}}{1}} \cdot \frac{\sqrt{2}}{1}$ $3$	 ✓ $\frac{1}{\sqrt{2}} / \frac{\sqrt{2}}{2}$  ✓ $\frac{\sqrt{3}}{1}$  ✓ $\frac{1}{\sqrt{2}} / \frac{\sqrt{2}}{2}$ (denominator / noemer)  ✓ answer/antwoord <b>Answer only/ Slegs antw</b> <b>0/4</b> (4)
4.4	$\cos\beta = \frac{3}{5}$ $y^2 = 5^2 - 3^2$	✓ $\cos\beta = \frac{3}{5}$ ✓ application Pyth. Th. toepassing van Pyth. St.



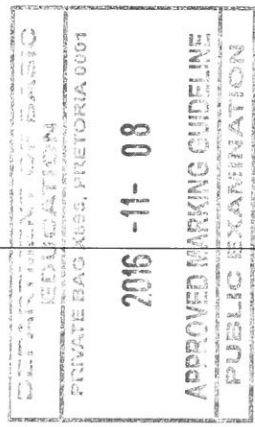


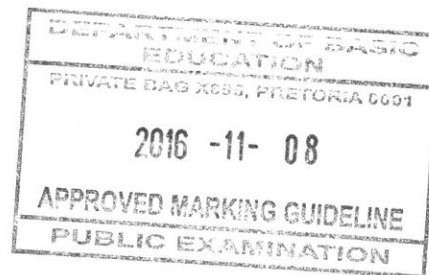
	$y = 4$ $\therefore \cot \alpha = \frac{4}{3}$ <b>OR/OF</b> $\cos \beta = \frac{3}{5}$ $\beta = 53,13^\circ$ $\alpha = 36,87^\circ$ $\cot \alpha = \frac{1}{\tan 36,87^\circ} = 1,33$	Or reason/ of rede Pyth ✓ $y = 4$ ✓ answer/antwoord (4)  ✓ $\cos \beta = \frac{3}{5}$ ✓ value of / waarde van $\beta$ ✓ value of/waarde van $\alpha$ ✓ answer / antw (4)  [17]
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**QUESTION 5/VRAAG 5**

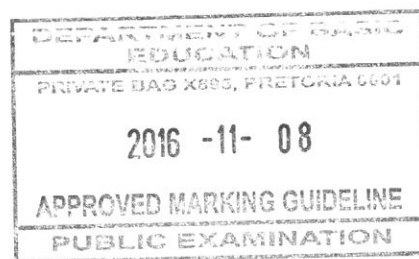
<p>5.1.1</p>	<p>In <math>\Delta AMN</math></p> $\tan \hat{M} = \frac{AN}{MN}$ $\tan 21^\circ = \frac{AN}{15}$ $AN = 15 \cdot \tan 21^\circ$ $AN = 5,76 \text{ units/eenhede}$	<p>✓ <math>\tan \hat{M} = \frac{AN}{MN}</math></p> <p>✓ substitute/vervang</p> <p>✓ answer/antwoord</p> <p>(3)</p>
<p>5.1.2</p>	<p><math>PN = 2 (5,76)</math>  <math>= 11,52</math></p> $\tan \hat{M} = \frac{PN}{MN}$ $= \frac{11,52}{15}$ $\hat{M} = 37,52^\circ$ $\therefore \hat{PMN} = 37,52^\circ$	<p>✓ <math>PN = 11,52</math></p> <p>✓ <math>\tan \hat{M} = \frac{11,52}{15}</math></p> <p>✓ answer/antwoord</p> <p>(3)</p>
<p>5.1.3</p>	<p><math>\sin 37,52 = \frac{11,52}{MP}</math></p> $MP = \frac{11,52}{\sin 37,52}$ <p><math>MP = 18,92</math> (accept 18,91 also / aanvaar ook 18,91)</p> <p><b>OR/OF</b></p> $MP^2 = 15^2 + 11,52^2 \text{ Pyth}$ $MP = 18,91$ <p><b>ANY OTHER VALID METHOD/ ENIGE ANDER GELDIGE METODE</b></p>	<p>✓ <math>\sin 37,52^\circ = \frac{11,52}{MP}</math></p> <p>✓ MP subject/onderwerp</p> <p>✓ answer/antwoord</p> <p>✓ using Pyth gebruik</p> <p>✓ subst</p> <p>✓ answer/antw</p> <p>(3)</p>
<p>5.2</p>	<p><math>2\sin(\theta + 15^\circ) = 1,462</math>  <math>\sin(\theta + 15^\circ) = 0,731</math>  <math>\therefore \theta + 15^\circ = 46,97^\circ</math>  <math>\theta = 46,97^\circ - 15^\circ</math>  <math>\theta = 31,97^\circ</math></p>	<p>✓ 0,731</p> <p>✓ <math>46,97^\circ</math></p> <p>✓ answer/antwoord</p> <p>Answer only /slegs antw</p> <p>3/3</p> <p>(3)</p>





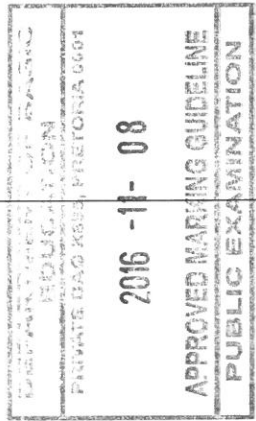
## QUESTION 6/VRAAG 6

6.1	$a = 2$	✓ answer/antwoord (1)
6.2	Period/periode $f = 360^\circ$	✓ answer/antwoord (1)
6.3	$y \in [0; 2]$ or / of $0 \leq y \leq 2$	✓ 0 and 2 ✓ notation / notasie (2)
6.4	$0^\circ < x < 180^\circ$	✓ critical values/ kritiese waardes ✓ correct inequalities / korrekte ongelykhede (2)
6.5	$y = -\cos x - 1 + 2$ $= -\cos x + 1$	✓ $-\cos x - 1$ ✓ $+ 2$ OR / OF ✓ ✓ answer/antwoord Answer only Slegs antw 2/2 (2) [8]

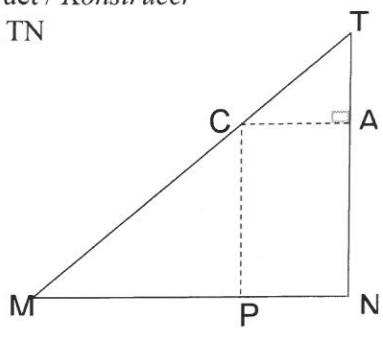


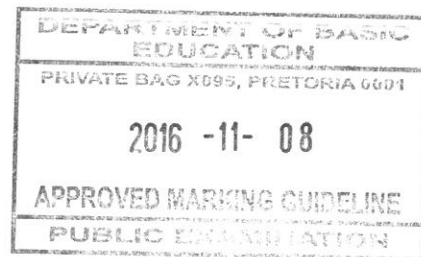
**QUESTION 7/VRAAG 7**

<p>7.1</p>	$\frac{LM}{3100} = \tan\beta = 0,21$ $\therefore LM = 3100 \times 0,21 = 651 \text{ m}$ $\frac{TN}{3100} = \tan\theta = 0,35$ $\therefore TN = 3100 \times 0,35 = 1085 \text{ m}$ $\frac{LM}{TN} = \frac{651}{1085} = \frac{3}{5}$ <p><b>OR / OF</b></p> $\tan\beta = \frac{LM}{MN} = 0,21 \quad \tan\theta = \frac{TN}{MN} = 0,35$ $\frac{LM}{MN} \div \frac{TN}{MN} = \frac{0,21}{0,35}$ $\frac{LM}{TN} = \frac{0,21}{0,35}$ $= \frac{3}{5}$ $\therefore LM : TN$ $3 : 5$	<p>✓ <math>\frac{LM}{3100} = \tan\beta = 0,21</math></p> <p>✓ 651m</p> <p>✓ 1085m</p> <p>✓ answer/ antwoord</p> <p>✓ <math>\tan\beta = \frac{LM}{MN}</math></p> <p>✓ <math>\tan\theta = \frac{TN}{MN}</math></p> <p>✓ <math>\frac{LM}{MN} \div \frac{TN}{MN} = \frac{0,21}{0,35}</math></p> <p>✓ answer/antw LM : TN</p> <p>(4)</p>
<p>7.2.1</p>	$\tan\theta = 0,35$ $\theta = 19,29^\circ$ $\therefore \hat{MTN} = 70,71^\circ$	<p>✓ <math>\theta = 19,29^\circ</math></p> <p>✓ answer/ antwoord</p> <p>(2)</p>
<p>7.2.2</p>	$\cos 19,29^\circ = \frac{3100}{TM}$ $TM = 3284,39$ $CM = 2884,39$ $\therefore \sin 19,29^\circ = \frac{CP}{2884,39}$ $\therefore CP = 2884,39(\sin 19,29^\circ)$ $CP = 952,86 \text{ m}$	<p>✓ <math>\cos 19,29^\circ = \frac{3100}{TM}</math></p> <p>✓ <math>TM = 3284,39</math></p> <p>✓ <math>CM = 2884,39</math></p> <p>✓ <math>\sin 19,29^\circ = \frac{CP}{2884,39}</math></p> <p>✓ answer/ antwoord</p> <p>(5)</p>



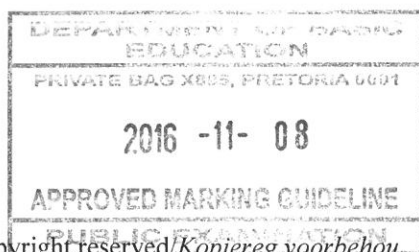
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	<p><b>OR / OF</b> Construct / <i>Konstrueer</i> CA ⊥ TN</p>  <p>In <math>\Delta TAC</math> : <math>\frac{TA}{400} = \cos 70,0995 \dots</math></p> <p><math>\therefore TA = 400 \cos 70,0995 \dots = 132,14 \dots</math></p> <p>Then <math>CP = 1085 - 132,14 \dots</math> <math>= 952,86 \text{ m}</math></p>	<p>✓ construction of CA <i>Konstrueer CA</i></p> <p>✓ <math>\frac{TA}{400} = \cos 70,0995 \dots</math></p> <p>✓ 132,14</p> <p>✓ subtracting / <i>afrek</i> ✓ answer / <i>antw</i></p> <p>(4) [11]</p>
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## QUESTION 8/ VRAAG 8

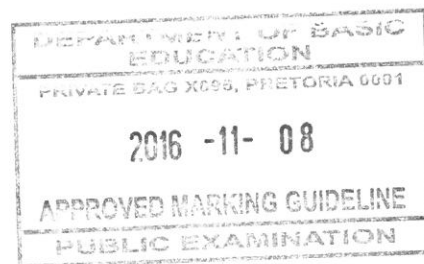
8.1	is a parallelogram/ <i>is 'n parallelogram</i>	✓ answer/ <i>antwoord</i> (1)
8.2	In $\Delta ABD$ and/ <i>en</i> $\Delta CDB$ $\hat{D}_1 = \hat{B}_2$ [ alt. angles/ <i>verw. hoek</i> ,AD $\parallel$ BC] $\hat{B}_1 = \hat{D}_2$ [ alt. angles/ <i>verw. hoek</i> ,AB $\parallel$ DC] BD = BD [common side/ <i>dieselde sy</i> ] $\therefore \Delta ABD \equiv \Delta CDB$ [A,A,S] $\therefore AB = DC, AD = BC$	✓S ✓R ✓S/R ✓S/R ✓S/R ✓S Penalise once for leaving out $\parallel$ lines in reason <i>Penaliseer slegs een keer vir <math>\parallel</math> lyne in rede</i> (6)
8.3.1	Let/Laat $\hat{N}_1 = \hat{N}_2 = x$ [ ON bisects/ <i>halveer</i> $\hat{KNM}$ ] Let/Laat $\hat{M}_1 = \hat{M}_2 = y$ [ OM bisects/ <i>halveer</i> $\hat{NMP}$ ] $\therefore 2x + 2y = 180^\circ$ [co-int./ <i>ko-bin. hoek</i> KN $\parallel$ PM] $\therefore x + y = 90^\circ$ $\hat{O}_2 + x + y = 180^\circ$ [ int. angles of/ <i>binnehoeke</i> van $\Delta$ ] $\therefore \hat{O}_2 + 90^\circ = 180^\circ$ $\therefore \hat{O}_2 = 90^\circ$	✓S/R  ✓S/R ✓substitution/ <i>vervang</i> ( $x + y = 90^\circ$ ) (3)
8.3.2	$\hat{N}_2 = \hat{O}_1$ [alt. angle/ <i>verw. hoek</i> KP $\parallel$ NM] $\hat{O}_1 = \hat{N}_1$ $\therefore KO = KN$ [ opp. Angles =/ <i>oorst hoeke</i> =] $\hat{O}_3 = \hat{M}_1$ [ alt angle/ <i>verw.</i> KP $\parallel$ MN] $\hat{O}_3 = \hat{M}_2$ $\therefore OP = PM$ [sides opp. = angles] [ <i>sy e oor. = hoeke</i> ] But/ <i>Maar</i> KN = PM [ opp. sides =/ <i>oor sye</i> =] $\therefore KO = OP$ $\therefore O$ is the midpoint/ <i>middelpunt</i>	✓ S/R ✓ S  ✓ S/R  ✓ S/R ✓ S  (6) <b>[16]</b>



## QUESTION 9/VRAAG 9

9.1	half the length of /die helfde van die lengte van	✓ half /helfte (1)
9.2	<p>AB ∥ QR [line joining midpoint or midpoint theorem] [lyn deur middelpunte of middelpuntstelling]</p> <p><math>AB = \frac{1}{2} QR</math> [line joining midpoint] [lyn deur middelpunte]</p> <p>DE ∥ QR [line joining midpoint/lyn deur middelpunte] <math>DE = \frac{1}{2} QR</math></p> <p>∴ AB ∥ DE and/en AB = DE</p> <p>∴ ADEB is a parm. [one pair of opp. sides = and ∥] [een paar teenoorstande sye = en ∥]</p>	<p>✓R</p> <p>✓S/R</p> <p>✓S</p> <p>✓S (both/albei)</p> <p>✓R</p> <p>(5) [6]</p>

TOTAL/TOTAAL: 100





**NOTE:**

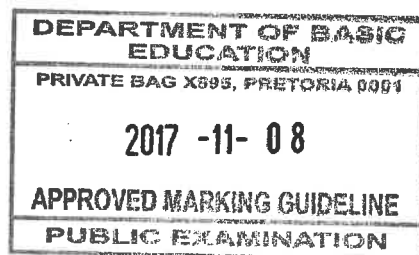
- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guidelines.
- Assuming values/answers in order to solve a problem is unacceptable.

**LET WEL:**

- As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.
- Volgehoue akkuraatheid is op ALLE aspekte van die nasienriglyne van toepassing.
- Dit is onaanvaarbaar dat waardes/antwoorde veronderstel word om 'n probleem op te los.

**QUESTION/VRAAG 1**

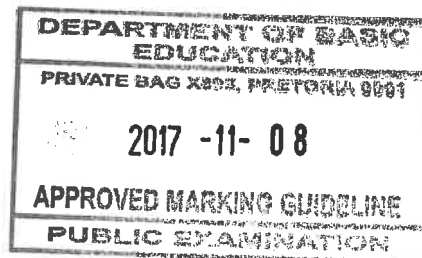
1.1	<p>34 37 43 46 48 48 52 54 58 62 68 73 78 84 90</p> <p>Median/Mediaan = 54</p>	<p>✓ arranging in ascending order/ rangskik in stygende orde ✓ answ./antw.</p> <p>(2)</p>
1.2	<p>Range/Variasiewydte = 90 – 34 = 56</p>	<p>✓ difference between max and min/ verskil tussen maks en min ✓ answ./antw.</p> <p>(2)</p>
1.3	<p>IQR(IKV) = <math>Q_3 - Q_1</math> = 73 – 46 = 27</p>	<p>✓ <math>Q_1 = 46</math> ✓ <math>Q_3 = 73</math> ✓ answ./antw.</p> <p>(3)</p>
1.4		<p>✓ min. &amp; max./maks. ✓ median/mediaan (<math>Q_2</math>) ✓ <math>Q_1</math> and/en <math>Q_3</math></p> <p>(3)</p>
		[10]



*M.S.*

**QUESTION/VRAAG 2**

2.1	30 days/dae	✓ answ./antw. (1)
2.2	$28 \leq T < 32$	✓ answ./antw. (1)
2.3	<p>The mean/Gemiddeld <math>(\bar{X}) = \frac{2(22) + 4(26) + 9(30) + \dots + 3(42)}{30}</math></p> $= \frac{44 + 104 + 270 + 170 + 266 + 126}{30}$ $= \frac{980}{30}$ $= 32,67^\circ \text{C.}$	✓ addition/optel ✓ 30  ✓ answ./antw. (3)
2.4	$9 + 5 + 7 + 3 = 24 \text{ days/dae}$ $\% \text{ of number of days/getal dae} = \frac{24}{30} \times 100$ $= 80\%$	✓ addition/optel  ✓ answ./antw. (2)
		<b>[7]</b>



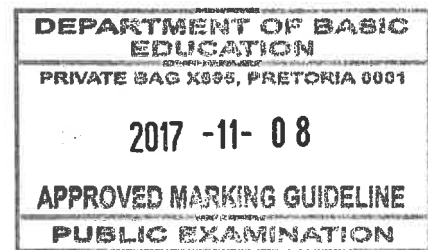
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**QUESTION/VRAAG 3**

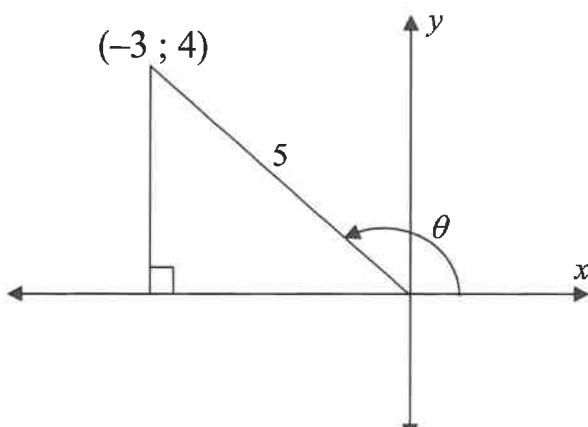
<p>3.1</p>	$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(7 - 6)^2 + (4 - 6)^2}$ $= \sqrt{(1)^2 + (-2)^2}$ $= \sqrt{5}$	<p>✓ subst. into dist formula/verv. In afstandsformule</p> <p>✓ answ./antw.</p> <p>(2)</p>
<p>3.2</p>	$\left(\frac{6+t}{2}; \frac{6+k}{2}\right) = \left(\frac{7}{2}; \frac{7}{2}\right)$ $\frac{6+t}{2} = \frac{7}{2} \quad \frac{6+k}{2} = \frac{7}{2}$ $t = 1 \quad k = 1$ <p>S(1;1)</p>	<p>✓ <math>\frac{6+t}{2} = \frac{7}{2}</math></p> <p>✓ <math>\frac{6+k}{2} = \frac{7}{2}</math></p> <p>✓ answ./antw.</p> <p>(3)</p>
<p>3.3</p>	$PR = \sqrt{(x_p - x_R)^2 + (y_p - y_R)^2}$ $= \sqrt{(7 - 0)^2 + (4 - 3)^2}$ $= \sqrt{50} \text{ (or } 5\sqrt{2} \text{ or } 7,07)$ $QS = \sqrt{(x_s - x_Q)^2 + (y_s - y_Q)^2}$ $= \sqrt{(1 - 6)^2 + (1 - 6)^2}$ $= \sqrt{50} \text{ (or } 5\sqrt{2} \text{ or } 7,07)$ <p>∴ PR = QS</p>	<p>✓ length of PR / lengte van PR</p> <p>✓ length of QS / lengte van QS</p> <p>(2)</p>
<p>3.4</p>	$m_{QR} = \frac{6-3}{6-0} = \frac{1}{2}$ $m_{RS} = \frac{3-1}{0-1} = -2$ $m_{QR} \times m_{RS}$ $= \frac{1}{2} \times -2$ $= -1$ $m_{QR} \times m_{RS} = -1$ <p>∴ QR ⊥ RS</p>	<div style="border: 1px solid black; padding: 5px; text-align: center;"> <p>DEPARTMENT OF BASIC EDUCATION</p> <p>PRIVATE BAG 9589, PRETORIA 0001</p> <p>2017 -11- 08</p> <p>APPROVED MARKING GUIDELINE</p> <p>PUBLIC EXAMINATION</p> </div> <p>✓ <math>m_{QR} = \frac{1}{2}</math></p> <p>✓ <math>m_{RS} = -2</math></p> <p>✓ <math>\frac{1}{2} \times -2</math></p> <p>✓ <math>m_{QR} \times m_{RS} = -1</math></p> <p>(4)</p>
<p>3.5</p>	<p>Rectangle./Reghoek.</p> <p>The diagonals are equal and one of the interior angles is equal to 90°.</p> <p>Die hoeklyne is gelyk en een van die binnehoeke is gelyk aan 90°.</p>	<p>✓ Rectangle/Reghoek</p> <p>✓ reason/rede</p> <p>(2)</p>

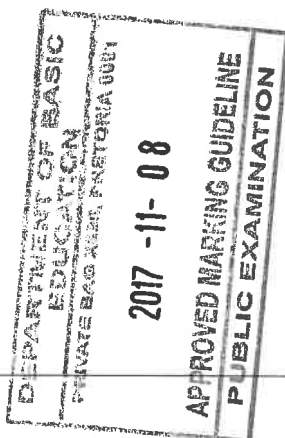
*M.S*

<p>3.6</p>	<p> <math>RS = \sqrt{5}</math>      Opposite sides of rectangle  <math>\cos R\hat{S}Q = \frac{\sqrt{5}}{5\sqrt{2}}</math>  <math>R\hat{S}Q = 71,57^\circ</math>   <b>OR/OF</b>  <math>QR = \sqrt{(6-0)^2 + (6-3)^2} = \sqrt{45}</math>  <math>\sin R\hat{S}Q = \frac{\sqrt{45}}{5\sqrt{2}}</math>  <math>R\hat{S}Q = 71,57^\circ</math>   <b>OR/OF</b>  <math>QR = \sqrt{(6-0)^2 + (6-3)^2} = \sqrt{45}</math>  <math>RS = \sqrt{5}</math>      Opposite sides of rectangle  <math>\tan R\hat{S}Q = \frac{\sqrt{45}}{\sqrt{5}}</math>  <math>R\hat{S}Q = 71,57^\circ</math> </p>	<p> <math>\checkmark RS = \sqrt{5}</math>  <math>\checkmark \cos R\hat{S}Q = \frac{\sqrt{5}}{5\sqrt{2}}</math>  <math>\checkmark \text{answ./antw.}</math>      (3)   <b>OR/OF</b>  <math>\checkmark QR = \sqrt{45}</math>  <math>\checkmark \sin R\hat{S}Q = \frac{\sqrt{45}}{5\sqrt{2}}</math>  <math>\checkmark \text{answ./antw.}</math>      (3)   <b>OR/OF</b>  <math>\checkmark QR = \sqrt{45}</math>  <math>\checkmark \tan R\hat{S}Q = \frac{\sqrt{45}}{\sqrt{5}}</math>  <math>\checkmark \text{answ./antw.}</math>      (3)                 </p>
		<b>[16]</b>

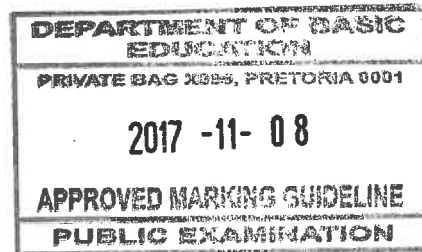


**QUESTION/VRAAG 4**

<p>4.1.1 (a)</p>	<p><math>4 \cot \theta + 3 = 0</math>  <math>\cot \theta = -\frac{3}{4}</math></p>  <p><math>\cos \theta = -\frac{3}{5}</math></p>	<p>✓ <math>\cot \theta = -\frac{3}{4}</math></p> <p>✓ diagram</p> <p>✓ <math>r = 5</math></p> <p>✓ <math>\cos \theta = -\frac{3}{5}</math></p> <p>(4)</p>
<p>4.1.1 (b)</p>	<p><math>\frac{3 \sin \theta \sec \theta}{\tan \theta}</math>  <math>= 3 \left( \frac{\left( \frac{4}{5} \right) \left( -\frac{5}{3} \right)}{-\frac{4}{3}} \right)</math>  <math>= 3</math></p>	<p>✓ <math>\frac{4}{5}</math></p> <p>✓ <math>-\frac{5}{3}</math></p> <p>✓ <math>-\frac{4}{3}</math></p> <p>✓ answ./antw.</p> <p>(4)</p>
<p>4.1.2</p>	<p><math>LHS = \left( \frac{4}{5} \right)^2 - 1</math>  <math>= -\frac{9}{25}</math></p> <p><math>RHS = -\left( \frac{3}{5} \right)^2</math>  <math>= -\frac{9}{25}</math></p> <p><math>\therefore \sin^2 \theta - 1 = -\cos^2 \theta.</math></p>	<p>✓ subst./verv.</p> <p>✓ answ./antw.</p> <p>✓ answ./antw.</p> <p>(3)</p>
<p>4.2</p>	<p><math>\cos 30^\circ \tan 60^\circ + \operatorname{cosec}^2 45^\circ \sin^2 60^\circ</math>  <math>= \frac{\sqrt{3}}{2} \times \sqrt{3} + \left( \frac{2}{\sqrt{2}} \right)^2 \times \left( \frac{\sqrt{3}}{2} \right)^2</math>  <math>= \frac{3}{2} + \frac{4}{2} \times \frac{3}{4}</math>  <math>= \frac{3}{2} + \frac{3}{2}</math>  <math>= 3</math></p>	<p>✓ any 2 ratios correct / enige twee verhoudings korrek</p> <p>✓ other 2 ratios correct / ander twee verhoudings korrek</p> <p>✓ answ./antw.</p> <p>(3)</p>

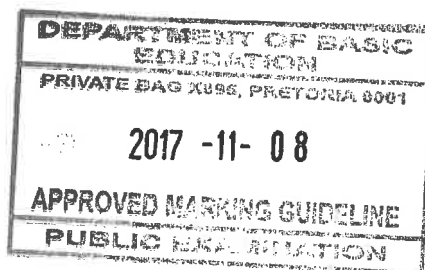


4.3	$\frac{4}{3} \sin \theta = \cos 37^\circ$ $\sin \theta = \frac{3(0,79863551)}{4}$ $\theta = 36,8^\circ$	✓ multiplying by/ <i>vermenigvuldig met</i> $\frac{3}{4}$ ✓ answ./antw. (2) <b>[16]</b>
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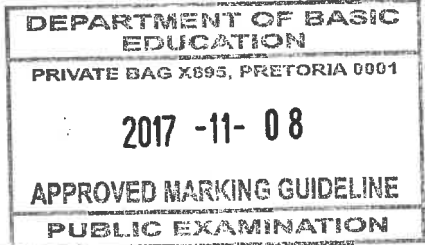
**QUESTION/VRAAG 5**

<p>5.1</p>		<p><i>f</i></p> <ul style="list-style-type: none"> <li>✓ shape/vorm</li> <li>✓ x-intercept/afsnit</li> <li>✓ y-intercept/afsnit</li> </ul> <p><i>g</i></p> <ul style="list-style-type: none"> <li>✓ shape/vorm</li> <li>✓ x-intercepts/afsnitte</li> <li>✓ y-intercept/afsnit</li> </ul> <p>(6)</p>
<p>5.2.1</p>	<p>Amplitude of/van <math>g = 2</math></p>	<p>✓ answ./antw.</p> <p>(1)</p>
<p>5.2.2</p>	<p>Range of/Waardeversameling van <math>f : -2 \leq y \leq 0</math>  <b>OR/OF</b>  <math>y \in [-2 ; 0]</math></p>	<p>✓ critical values/kritieke waardes</p> <p>✓ notation/notasie</p> <p>(2)</p>
<p>5.3.1</p>	<p>2 solutions/oplossings</p>	<p>✓ answ./antw.</p> <p>(1)</p>
<p>5.3.2</p>	<p><math>\sin x = 2 + 2 \cos x</math>  <math>\sin x - 1 - 2 \cos x = 1</math>  <math>f(x) - g(x) = 1</math>  <math>x = 126,87^\circ</math> or <math>x = 180^\circ</math></p>	<p>✓ manipulation / manipulasie</p> <p>✓ <math>x = 126,87^\circ</math></p> <p>✓ <math>x = 180^\circ</math></p> <p>(3)</p>
		<p>[13]</p>



**QUESTION/VRAAG 6**

6.1	$\theta = 47^\circ$	✓ answ./antw. (1)
6.2	$\sin P = \frac{RQ}{RP}$ $\sin 47^\circ = \frac{RQ}{21}$ $RQ = 21 \sin 47^\circ$ $RQ = 15,36 \text{ m}$ <p><b>OR/OF</b></p> $\hat{P}RQ = 43^\circ$ $\cos \hat{P}RQ = \frac{RQ}{RP}$ $\cos 43^\circ = \frac{RQ}{21}$ $RQ = 21 \cos 43^\circ$ $RQ = 15,36 \text{ m}$	✓ trig. ratio/trig. verhoud  ✓ correct subst./ korrekte instelling.  ✓ answ./antw. (3)
6.3	$\tan S = \frac{RQ}{QS}$ $\tan S = \frac{15,36}{17}$ $\hat{S} = \tan^{-1}\left(\frac{15,36}{17}\right)$ $\hat{S} = 42,10^\circ$	✓ subst into trig ratio./verv in trig verh  ✓ answ./antw. (2)
6.4	$\cos 47^\circ = \frac{PQ}{21}$ $PQ = 21 \times \cos 47^\circ$ $PQ = 14,32$ $PS = 14,32 + 17 = 31,32 \text{ m}$ <p><b>OR/OF</b></p>	$\sin 43^\circ = \frac{PQ}{21}$ $PQ = 21 \times \sin 43^\circ$ $PQ = 14,32$ $PS = 14,32 + 17 = 31,32 \text{ m}$ ✓ subst into trig. ratio/ verv in trig. verhoud  ✓ PQ = 14,32 m  ✓ addition/optel ✓ answ./antw. (4)

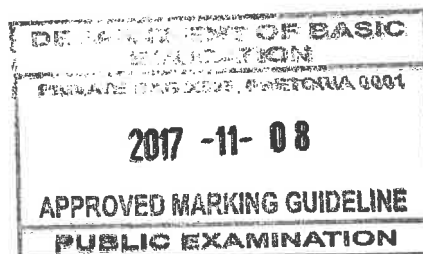




	$PQ^2 = PR^2 - RQ^2$ $= 21^2 - 15,36^2$ $= 205,07$ $PQ = 14,32$ $PS = 14,32 + 17$ $= 31,32 \text{ m}$	✓Th of Pyth/ <i>Stel van Pyth</i>  ✓PQ = 14,32 m  ✓addition/ <i>optel</i> ✓answ./ <i>antw.</i>  (4)
		<b>[10]</b>

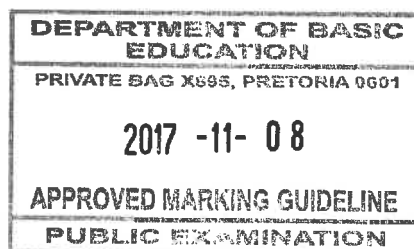
**QUESTION/VRAAG 7**

7.1	$V = \frac{1}{3} \pi r^2 h$ $83,38 = \frac{1}{3} \times 6,5 \pi r^2$ $r^2 = \frac{3 \times 83,38}{6,5 \pi}$ $r = 3,50 \text{ cm}$	✓subst./ <i>verv.</i>    ✓answ./ <i>antw.</i>  (2)
7.2	$s^2 = h^2 + r^2$ $s^2 = 6,5^2 + 3,5^2$ $s = 7,38 \text{ cm}$	✓subst./ <i>verv.</i>  ✓answ./ <i>antw.</i>  (2)
7.3	Surface area of the solid/ <i>Buite-oppervlakte (Oppervlakarea) van die vaste liggaam</i> $= 2\pi r^2 + \pi rs$ $= 2\pi(3,5)^2 + \pi(3,5)(7,38)$ $= 158,12 \text{ cm}^2$	✓subst./ <i>verv.</i>  ✓answ./ <i>antw.</i>  (2)
		<b>[6]</b>

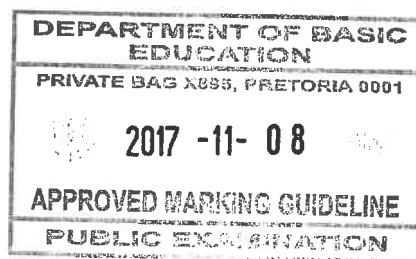


**QUESTION/VRAAG 8**

8.1.1	$\hat{O}_1 = 90^\circ$ Diagonal bisect at/ <i>Hoeklyne sny by</i> $90^\circ$ .	✓S/R  (1)
8.1.2	$\hat{L}_1 = 180^\circ - (34^\circ + 90^\circ)$ Sum of angles in/ <i>Som van hoeke</i> $\Delta$ . $= 56^\circ$	✓S ✓answ./ <i>antw.</i>  (2)
8.1.3	<p><math>\hat{L}_1 = \hat{L}_2 = 56^\circ</math> diagonals bisect the/<i>hoeklyne sny die</i> <math>\angle</math>s.  <math>\hat{L}_1 + \hat{L}_2 = \hat{N}_1 + \hat{N}_2</math> opp. <math>\angle</math>s of rhombus/<i>teenoorst <math>\angle</math>van die ruit</i> =  <math>\therefore \hat{K}\hat{N}\hat{M} = 112^\circ</math></p> <p><b>OR/OF</b>  <math>\hat{K}_1 = 34^\circ</math> diagonals bisect the/<i>hoeklyne sny die</i> <math>\angle</math>s.</p> <p><math>\hat{K}\hat{N}\hat{M} + 68^\circ = 180^\circ</math> co - int angles <math>KL \parallel NM</math>  <math>\therefore \hat{K}\hat{N}\hat{M} = 112^\circ</math></p> <p><b>OR/OF</b>  <math>\hat{N}_2 = 56^\circ</math> alt angles <math>KL \parallel NM</math></p> <p><math>\hat{N}_1 = \hat{N}_2 = 56^\circ</math> diagonals bisect the/<i>hoeklyne sny die</i> <math>\angle</math>s.  <math>\therefore \hat{K}\hat{N}\hat{M} = 112^\circ</math></p>	<p>✓S/R  ✓answ./<i>antw.</i>  (2)</p> <p><b>OR/OF</b> ✓S/R  ✓answ./<i>antw.</i>  (2)</p> <p><b>OR/OF</b>  ✓S/R  ✓answ./<i>antw.</i>  (2)</p>
8.2	<p>Given/<i>Gegee</i> : <math>\parallel^m PQRS</math> with diagonals/<i>met hoeklyne PR and/en QS</i>.</p> <p><i>R.P.T</i> : <math>PM = MR</math></p> <p>Proof/<i>Bewys</i> : In <math>\Delta PMS</math> and/en <math>\Delta RMQ</math></p> <p>1. <math>\hat{P}_1 = \hat{R}_1</math> (alt./<i>verw. <math>\angle</math>s, <math>PS \parallel QR</math></i>)                  2. <math>\hat{S}_1 = \hat{Q}_1</math> (alt./<i>verw. <math>\angle</math>s, <math>PS \parallel QR</math></i>)                  3. <math>PS = QR</math> (opp. sides <i>parm</i> are /<i>teenoorst. sye van parm.</i> =)</p> <p><math>\therefore \Delta PMS \equiv \Delta RMQ</math> (AAS)</p> <p><math>\Rightarrow PM = MR</math> and <math>MS = MQ</math></p> <p><b>OR/OF</b></p>	<p>✓ 1. S/R ✓ 2. S ✓ 3. S/R</p> <p>✓ congruency/<i>kongruensie</i> (AAS)  (4)</p> <p><b>OR/OF</b></p>



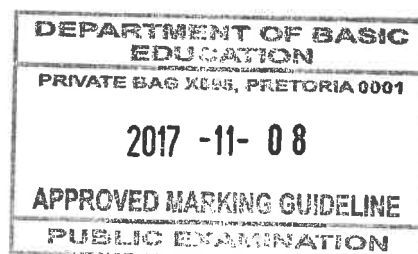
	<p>Given/Gegee <math>\parallel</math>:<sup>m</sup> PQRS with diagonals/met hoeklyne PR and/en QS.</p> <p>R.P.T : <math>QM = MS</math></p> <p>Proof/Bewys : In <math>\triangle PQM</math> and/en <math>\triangle RSM</math></p> <p>1. <math>\hat{P}_2 = \hat{R}_2</math> (alt./verw. <math>\angle_s, QP \parallel SR</math>)</p> <p>2. <math>\hat{S}_2 = \hat{Q}_2</math> (alt./verw. <math>\angle_s, SR \parallel PQ</math>)</p> <p>3. <math>PQ = SR</math> (opp. sides parm are/teenoorst. sye van parm =)</p> <p><math>\therefore \triangle PQM \equiv \triangle RSM</math> (AAS)</p> <p><math>\Rightarrow QM = MS</math> and <math>PM = MR</math></p>	<p>✓ 1. S/R</p> <p>✓ 2. S</p> <p>✓ 3. S/R</p> <p>✓ congruency/kongruensie (AAS)</p> <p>(4)</p>
<p>8.3</p>	<p><math>DB = 2DE</math> (diagonals bisect each other)</p> <p><math>DE = FC</math> (opp. side of/teenoorst. sy van //gram.)</p> <p>but/maar <math>FC = 2KC</math> (diagonals bisect each other)</p> <p><math>DE = 2KC</math> (<math>DE = FC</math>)</p> <p><math>DB = 2(2KC)</math> (<math>DB = 2DE</math>)</p> <p><math>DB = 4KC</math></p>	<p>✓ S/R</p> <p>✓ S/R</p> <p>✓ S</p> <p>✓ S</p> <p>(4)</p>
		<p>[13]</p>



## QUESTION/VRAAG 9

9.1	<p>In <math>\triangle ACG</math> <math>F</math> and/en <math>H</math> are midpoints/is middelpunte (given/gegee)  <math>\therefore FH \parallel CG</math> (line joining the midpoints/ lynstuk wat middelpunte verbind)  <math>FE \parallel BC</math> (same straight lines/dieselfde reguitlyne)</p> <p>In <math>\triangle AGB</math>, <math>H</math> is the midpoint/is die middelpunt  <math>HE \parallel BG</math> (proved/bewys)  <math>\therefore E</math> is the midpoint/is die middelpunt          (Line drawn from midpt of side/Lyn getrek vanaf midpt van sy,          // to 2nd side/na 2de sy)</p>	<p>✓ <math>FH \parallel CG</math>          ✓ reason/rede</p> <p>✓ reason/rede</p> <p>(3)</p>
9.2	<p><math>\hat{A}EH = \hat{A}BC = 90^\circ</math> (Corr angle/Ooreenst hoek <math>BC \parallel EF</math>)</p> <p>In <math>\triangle AEH</math>, Area/Oppervl. = <math>\frac{1}{2} EH \times AE</math></p> $9,5 = \frac{1}{2} \times 3,5 \times AE$ $AE = \frac{38}{7} = 5,43 \text{ cm}$ $AB = 2AE$ $AB = 2\left(\frac{38}{7}\right)$ $= \frac{76}{7}$ $= 10,86 \text{ cm}$	<p>✓ subst./verv.</p> <p>✓ <math>AE</math></p> <p>✓ <math>AB</math></p> <p>(3)</p>
9.3	<p><math>BG = 7 \text{ cm}</math> (line joining the midpoints/ lynstuk wat middelpunte verbind)  <math>BC = 14 \text{ cm}</math></p> <p>In <math>\triangle ABC</math>, Area/Oppervl. = <math>\frac{1}{2} BC \times AB</math></p> $= \frac{1}{2} \times 14 \times \frac{76}{7}$ $= 76 \text{ cm}^2$	<p>✓ S/R          ✓ <math>BC=2BG=14</math></p> <p>✓ answ./antw.</p> <p>(3)</p>
		[9]

TOTAL/TOTAAL: 100



**NOTE:**

- If a candidate answered a question TWICE, mark only the FIRST attempt.
- If a candidate crossed out an answer and did not redo it, mark the crossed-out answer.
- Consistent accuracy applies to ALL aspects of the marking guidelines.
- Assuming values/answers in order to solve a problem is unacceptable.

**LET WEL:**

- As 'n kandidaat 'n vraag TWEE keer beantwoord het, sien slegs die EERSTE poging na.
- As 'n kandidaat 'n antwoord deurgehaal en nie oorgedoen het nie, sien die deurgehaalde antwoord na.
- Volgehoue akkuraatheid is op ALLE aspekte van die nasienriglyne van toepassing.
- Dit is onaanvaarbaar om waardes/antwoorde te veronderstel om 'n probleem op te los.

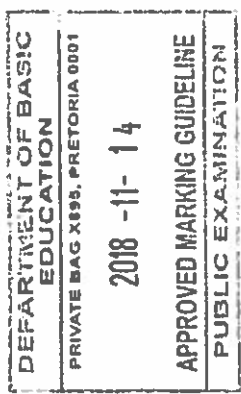
**QUESTION/ VRAAG 1**

DEPARTMENT OF BASIC EDUCATION PRIVATE BAG X895, PRETORIA 0001 2018 -11- 14 APPROVED MARKING GUIDELINE PUBLIC EXAMINATION	1	<table border="1"> <thead> <tr> <th>Marks/Punte</th> <th>Frequency/Frekwensie</th> </tr> </thead> <tbody> <tr><td>0</td><td>0</td></tr> <tr><td>1</td><td>3</td></tr> <tr><td>2</td><td>4</td></tr> <tr><td>3</td><td>5</td></tr> <tr><td>4</td><td>3</td></tr> <tr><td>5</td><td>6</td></tr> <tr><td>6</td><td>0</td></tr> <tr><td>7</td><td>7</td></tr> <tr><td>8</td><td>9</td></tr> <tr><td>9</td><td>5</td></tr> <tr><td>10</td><td>0</td></tr> </tbody> </table>	Marks/Punte	Frequency/Frekwensie	0	0	1	3	2	4	3	5	4	3	5	6	6	0	7	7	8	9	9	5	10	0	2 marks: all 11 values correct  1 mark: 5 – 10 values correct  0 marks: 0 – 4 values correct  (2)
	Marks/Punte	Frequency/Frekwensie																									
	0	0																									
	1	3																									
	2	4																									
	3	5																									
	4	3																									
	5	6																									
	6	0																									
	7	7																									
	8	9																									
	9	5																									
10	0																										
1.2	42 learners/leerders	✓ answer/antwoord (1)																									
1.3.1	Range/Variasiewydte $= 9 - 1$ $= 8$	Answer only: 2/2 marks  ✓ max = 9 and min = 1 ✓ answer/antwoord (2)																									
1.3.2	$\bar{x} = \frac{(1 \times 3) + (2 \times 4) + (3 \times 5) + (4 \times 3) + (5 \times 6) + (7 \times 7) + (8 \times 9) + (9 \times 5)}{42}$ $= \frac{234}{42}$ $= 5,57$	✓ sum of (frequencies × values)  ✓ ÷ n ✓ answer/antwoord (3)																									
1.4	Position of the median/Posisie van die mediaan = $\frac{n+1}{2}$ $= 21,5^{th/de}$ position/posisie $Q_2 = \frac{5+7}{2}$ $= 6$	Answer only: 3/3 marks  ✓ identification of 5 and 7 ✓ $\frac{5+7}{2}$ ✓ answer/antwoord (3)																									
1.5		✓ Q <sub>1</sub> ✓ Q <sub>3</sub> ✓ rest of the box  (3)																									
		<b>[14]</b>																									

CP

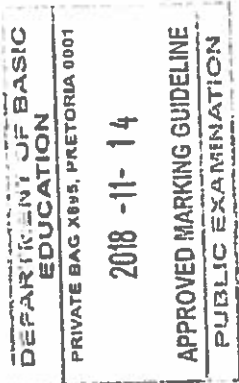
**QUESTION/VRAAG 2**

<p>2.1.1</p>	$PQ = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(1-6)^2 + (0-3)^2}$ $= \sqrt{25+9}$ $= \sqrt{34}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Answer only: 2/2 marks</div>	<p>✓ subst./verv.</p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(2)</p>
<p>2.1.2</p>	$m_{PQ} = \frac{y_2 - y_1}{x_2 - x_1}$ $= \frac{3-0}{6-1}$ $= \frac{3}{5}$ <div style="border: 1px solid black; padding: 5px; width: fit-content; margin: 10px auto;">Answer only: 2/2 marks</div>	<p>✓ subst./verv.</p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(2)</p>
<p>2.1.3</p>	$x_T = \frac{x_1 + x_2}{2}$ $= \frac{1+6}{2}$ $= \frac{7}{2}$ $T\left(\frac{7}{2}; \frac{3}{2}\right)$ $y_T = \frac{y_1 + y_2}{2}$ $= \frac{0+3}{2}$ $= \frac{3}{2}$	<p>✓ x-value/x-waarde</p> <p>✓ y-value/y-waarde</p> <p style="text-align: right;">(2)</p>
<p>2.2.1</p>	$QR = QP = \sqrt{34}$ $QT = \frac{1}{2}PQ$ $QT = \frac{1}{2}\sqrt{34}$ $QT = \sqrt{\left(\frac{7}{2}-6\right)^2 + \left(\frac{3}{2}-3\right)^2}$ $QT = \frac{\sqrt{34}}{2}$ <p style="text-align: center;">OR/OF</p> $\text{Area of } \Delta QTR = \frac{1}{2}(QR)(QT)$ $= \frac{1}{2}(\sqrt{34})\left(\frac{1}{2}\sqrt{34}\right)$ $= \frac{17}{2} = 8,5 \text{ sq units/eenhede}$ <p style="text-align: center;">OR/OF</p>	<p>✓ <math>QR = \sqrt{34}</math></p> <p>✓ <math>QT = \frac{1}{2}\sqrt{34}</math></p> <p>✓ answer/antwoord</p> <p style="text-align: right;">(3)</p>



*CP*

	$QR = QP = \sqrt{34}$ $\text{Area of } \Delta QTR = \frac{1}{2} \text{Area of } \Delta QPR$ $= \frac{1}{2} \left( \frac{1}{2} \cdot QR \cdot QP \right)$ $= \frac{1}{2} \times \frac{1}{2} \cdot (\sqrt{34}) (\sqrt{34})$ $= \frac{17}{2} \text{ sq units/eenhede}$	<p>✓ <math>QR = \sqrt{34}</math></p> <p>✓ <math>\frac{1}{2} \sqrt{34}</math></p> <p>✓ answer/antwoord (3)</p>
<p>2.2.2</p>	$0 = 121^\circ - 90^\circ$ $= 31^\circ$ <p>(ext <math>\angle</math> <math>\Delta</math>/buitehoek van <math>\Delta</math>)</p> <p><b>OR/OF</b></p> $\widehat{QSP} = 59^\circ$ <p>(<math>\angle</math> str line/hoek op reguitlyn)</p> $\theta = 31^\circ$ <p>(<math>\angle</math> sum <math>\Delta</math>/binnehoek van <math>\Delta</math>)</p>	<p>✓ reason</p> <p>✓ answer/antwoord (2)</p> <p>✓ <math>\angle</math> sum <math>\Delta</math>/binnehoek van <math>\Delta</math></p> <p>✓ answer/antwoord (2)</p>
<p>2.2.3</p>	$\cos \theta = \frac{PQ}{PS}$ $\cos 31^\circ = \frac{\sqrt{34}}{PS}$ $PS = \frac{\sqrt{34}}{\cos 31^\circ}$ $PS = 6,80$ <p>S(6,8 ; 0)</p> <p>S(7,8 ; 0)</p> <p><b>OR/OF</b></p> $m_{QR} = -\frac{5}{3}$ $\frac{3-0}{6-x} = -\frac{5}{3}$ $9 = -30 + 5x$ $x = 7,8$ <p><b>OR/OF</b></p> $m_{QR} = -\frac{5}{3}$ <p>Equation of QR</p> $y - 3 = -\frac{5}{3}(x - 6)$ $y = -\frac{5}{3}x + 13$ $0 = -\frac{5}{3}x + 13$ $x = 7,8$ <p>S(7,8 ; 0)</p>	$\sin \widehat{QSP} = \frac{PQ}{PS}$ $\sin 59^\circ = \frac{\sqrt{34}}{PS}$ $PS = \frac{\sqrt{34}}{\sin 59^\circ}$ $PS = 6,80$ <p>✓ <math>\cos \theta = \frac{PQ}{PS}</math> or/of</p> $\sin \widehat{QSP} = \frac{PQ}{PS}$ <p>✓ x-value/x-waarde</p> <p>✓ y-value/y-waarde (3)</p> <p>✓ <math>m_{QR} = m_{QS}</math></p> <p>✓ <math>y = 0</math></p> <p>✓ x-value/x-waarde (3)</p> <p>✓ equation of QR/verhouding van QR</p> <p>✓ <math>y = 0</math></p> <p>✓ x-value/x-waarde (3)</p>



2.3	$m_{QR} = \frac{3 - (-2)}{6 - (9)}$ $= -\frac{5}{3}$ $m_{T\text{-midpoint}} = m_{QR} \text{ (Midpoint Theorem)}$ $m_{T\text{-midpoint}} = -\frac{5}{3}$ <p><b>OR/OF</b></p> <p>Midpoint PR <math>\left(\frac{9+1}{2}; \frac{-2+0}{2}\right)</math></p> <p>Midpoint PR <math>(5; -1)</math></p> $m_{T\text{ and/en PR}} = \frac{\frac{3}{2} - (-1)}{\frac{7}{2} - (5)}$ $= -\frac{5}{3}$	<p>✓ <math>m_{QR}</math></p> <p>✓ <math>m_{T\text{-midpoint}} = m_{QR}</math></p> <p>✓ Midpoint theorem/ Middelpunt-stelling (3)</p> <p>✓ midpoint of PR</p> <p>✓ subst</p> <p>✓ answer (3)</p>
[17]		

## QUESTION/VRAAG 3

3.1.1	$\tan(90^\circ - R) = \frac{PR}{QP} \text{ OR/OF } \frac{q}{r}$	<p>✓ answer/antwoord (1)</p>
3.1.2	<p>sec Q</p> <p><b>OR/OF</b></p> <p>cosec R</p> <p><b>OR/OF</b></p> <p>cosec <math>(90^\circ - Q)</math></p> <p><b>OR/OF</b></p> <p>sec <math>(90^\circ - R)</math></p>	<p>✓ answer/antwoord (1)</p> <p>✓ answer/antwoord (1)</p> <p>✓ answer/antwoord (1)</p> <p>✓ answer/antwoord (1)</p> <p>✓ answer/antwoord (1)</p>
3.2.1	$OS = \sqrt{(-3)^2 + (-4)^2} \text{ (Pythagoras)}$ $= 5$	<p>Answer only: 2/2 marks</p> <p>✓ subst./verv.</p> <p>✓ answer/antwoord (2)</p>
3.2.2	$\sec\theta + \sin^2\theta$ $= -\frac{5}{3} + \left(-\frac{4}{5}\right)^2$ $= -\frac{5}{3} + \frac{16}{25}$ $= -\frac{77}{75}$	<p>✓ <math>-\frac{5}{3}</math></p> <p>✓ <math>-\frac{4}{5}</math></p> <p>✓ answer/antwoord (3)</p>



3.3

cosec  $45^\circ$ 

$$\frac{\sin 90^\circ \cdot \tan 60^\circ}{1}$$

$$= \frac{\sin 45^\circ}{(1) \cdot (\sqrt{3})}$$

$$= \frac{2}{\sqrt{2}} \div \sqrt{3}$$

$$= \frac{2}{\sqrt{2}} \times \frac{1}{\sqrt{3}}$$

$$= \frac{2}{\sqrt{6}}$$

**OR/OF**cosec  $45^\circ$ 

$$\frac{\sin 90^\circ \cdot \tan 60^\circ}{1}$$

$$= \frac{\sin 45^\circ}{(1) \cdot (\sqrt{3})}$$

$$= \frac{\sqrt{2}}{\sqrt{3}}$$

If the answer is left as  $\frac{\sqrt{6}}{3}$   
and no other rationalisation  
working is shown: max 3/4  
marks

$$\checkmark \frac{2}{\sqrt{2}}$$

$$\checkmark 1$$

$$\checkmark \sqrt{3}$$

✓ answer/antwoord (4)

$$\checkmark \sqrt{2}$$

$$\checkmark 1$$

$$\checkmark \sqrt{3}$$

✓ answer/antwoord (4)

[11]

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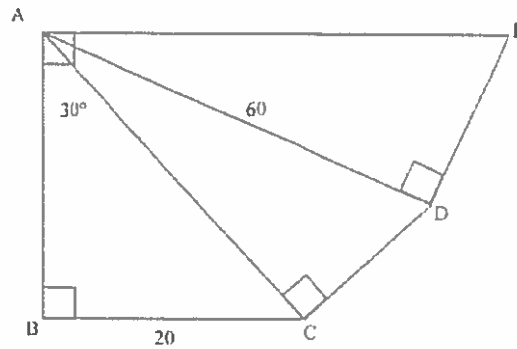
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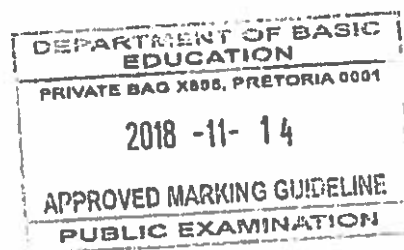
QUESTION/VRAAG 4



<p>4.1.1</p>	$\sin 30^\circ = \frac{20}{AC}$ $AC = \frac{20}{\sin 30^\circ}$ $AC = 40$ <p><b>OR/OF</b></p> $\cos 60^\circ = \frac{20}{AC}$ $AC = \frac{20}{\cos 60^\circ}$ $AC = 40$	$\text{cosec } 30^\circ = \frac{AC}{20}$ $AC = \frac{20}{\sin 30^\circ}$ $AC = 40$ <p><b>OR/OF</b></p> $\sec 60^\circ = \frac{AC}{20}$ $AC = \frac{20}{\cos 60^\circ}$ $AC = 40$	<p>✓ <math>\sin 30^\circ = \frac{20}{AC}</math> or <math>\text{cosec } 30^\circ = \frac{AC}{20}</math></p> <p>✓ answer/antwoord (2)</p> <p>✓ <math>\cos 60^\circ = \frac{20}{AC}</math> or <math>\sec 60^\circ = \frac{AC}{20}</math></p> <p>✓ answer/antwoord (2)</p>
<p>4.1.2</p>	$\cos \hat{CAD} = \frac{AC}{60}$ $\cos \hat{CAD} = \frac{40}{60}$ $\hat{CAD} = 48,19^\circ$	$\cos \hat{CAD} = \frac{AC}{60}$	<p>✓ <math>\cos \hat{CAD} = \frac{AC}{60}</math></p> <p>✓ answer/antwoord (2)</p>
<p>4.1.3</p>	$\hat{DAE} = 90^\circ - (30^\circ + \hat{CAD})$ $\hat{DAE} = 90^\circ - (30^\circ + 48,19^\circ)$ $= 11,81^\circ$ $\tan 11,81^\circ = \frac{DE}{60}$ $DE = 60 \tan 11,81^\circ$ $DE = 12,55$	$\hat{DAE} = 11,8^\circ$ $\tan 11,81^\circ = \frac{DE}{60}$	<p>✓ <math>\hat{DAE} = 11,8^\circ</math></p> <p>✓ <math>\tan 11,81^\circ = \frac{DE}{60}</math></p> <p>✓ answer/antwoord (3)</p>

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4.2.1	$\tan x = 2,01$ $x = 63,5^\circ$	If the rounding is incorrect: max 1/2 marks	✓✓ answer/antwoord (2)
4.2.2	$5 \cos x + 2 = 4$ $5 \cos x = 2$ $\cos x = \frac{2}{5}$ $x = 66,4218\dots^\circ$ $x = 66,4^\circ$		$\checkmark 5 \cos x = 2$ $\checkmark \cos x = \frac{2}{5}$  $\checkmark$ answer/antwoord (3)
4.2.3	$\frac{\operatorname{cosec} x}{2} = 3$ $\operatorname{cosec} x = 6$ $\frac{1}{\sin x} = 6$ $\sin x = \frac{1}{6}$ $x = 9,6^\circ$		$\checkmark \operatorname{cosec} x = 6$  $\checkmark \sin x = \frac{1}{6}$ $\checkmark$ answer/antwoord (3)
			[15]



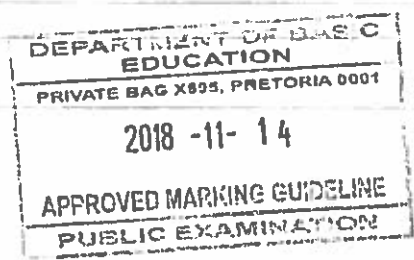
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**QUESTION/VRAAG 5**

5.1.1		<ul style="list-style-type: none"> <li>✓ Tan graph passing through (45°; -3) or (135°; 3) or (225°; -3) or (315°; 3)</li> <li>✓ x-intercepts/ x-snyppunte</li> <li>✓ both asymptotes/ albei asimptote</li> </ul> <p style="text-align: right;">(3)</p>
5.1.2(a)	180°	✓ answer/antwoord (1)
5.1.2(b)	$h(x) = 3 \tan x$	✓ answer/antwoord (1)
5.2.1	$a = -2$ $b = 1$	✓ a ✓ b (2)
5.2.2	$90^\circ < x < 270^\circ$ <b>OR/OF</b> $x \in (90^\circ ; 270^\circ)$	✓ answer/antwoord (1)
5.2.3	$-4 \leq y \leq 0$ <b>OR/OF</b> $y \in [-4 ; 0]$	✓ critical values/kritieke waardes ✓ notation/notasie (2)
5.2.4	$-2(\cos 0^\circ + \cos 1^\circ + \cos 2^\circ + \dots + \cos 358^\circ + \cos 359^\circ + \cos 360^\circ)$ $= -2(1)$ $= -2$	✓✓ answer/antwoord (2)

[12]

**QUESTION/VRAAG 6**



6.1	$r = 3 \text{ cm}$ $V = \pi r^2 h$ $117\pi = \pi(3)^2 h$ $h = 13 \text{ cm}$	<ul style="list-style-type: none"> <li>✓ <math>r = 3 \text{ cm}</math></li> <li>✓ subst./verv.</li> <li>✓ answer/antwoord</li> </ul> <p style="text-align: right;">(3)</p>
6.2	<p>TSA/TBO</p> $= \pi r^2 + 2\pi r h$ $= \pi(3)^2 + 2\pi(3)(13) \times 0,8$ $= 224,31 \text{ cm}^2$ <p style="text-align: center;"><b>OR/OF</b></p> <p>TSA/TBO</p> $= \pi r^2 + 2\pi r h$ $= \pi(3)^2 + 2\pi(3)(10,4)$ $= 224,31 \text{ cm}^2$	<ul style="list-style-type: none"> <li>✓ <math>\pi r^2 + 2\pi r h</math></li> <li>✓ subst./verv.</li> <li>✓ 80% of height/van hoogte</li> <li>✓ answer</li> </ul> <p style="text-align: right;">(4)</p>

[7]

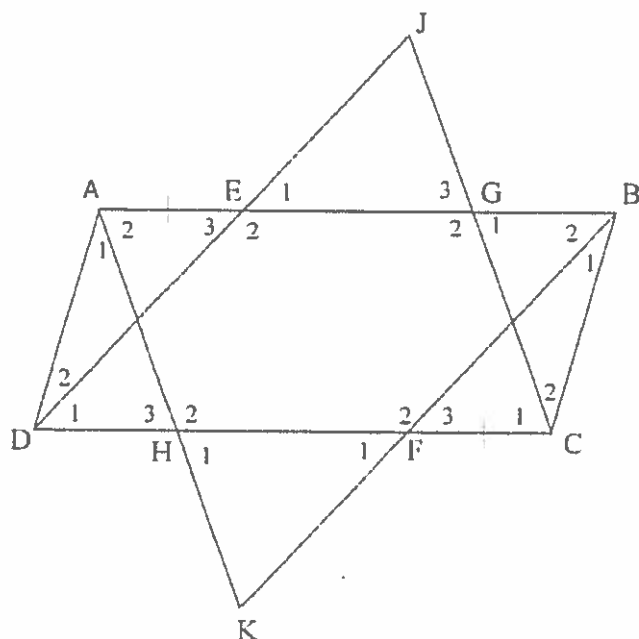
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**QUESTION/VRAAG 7**

7.1	Bisects the third side/ <i>Halveer die derde sy</i>	✓ answer/antwoord (1)
7.2		
7.2.1	$CR = PS$ (given) $PS = QR$ (opp sides //m =) $CR = QR$ $\hat{Q}_1 = \hat{C}_1 = 50^\circ$ ( $\angle$ s opp = sides) $\hat{R}_3 = 100^\circ$ (ext $\angle$ $\Delta$ ) $\hat{A} = 100^\circ$ (alt $\angle$ s; $QR \parallel AS$ )	$\checkmark CR = QR$ $\checkmark \hat{Q}_1 = \hat{C}_1 = 50^\circ$ $\checkmark \hat{R}_3 = 100^\circ$ $\checkmark \hat{A} = 100^\circ$ $\checkmark$ Reason (5)
7.2.2	$AP = PS$ (line from midpoint // to one side of triangle) $RS = 120$ (midpoint theorem) $QP = 120$ (opp sides //m =)  <b>OR/OF</b> <div style="border: 1px solid black; padding: 2px; display: inline-block;">Answer only: 1/3 marks</div> In $\Delta QBR$ and $\Delta PBA$ 1. $\hat{R}_1 = \hat{A}$ (proven) or (alt $\angle$ s; $QR \parallel QS$ ) 2. $\hat{B}_1 = \hat{B}_3$ (vert opp $\angle$ s) 3. $BR = BA$ (given) $\Delta QBR \cong \Delta PBA$ ( $\angle/\angle$ ) $QB = BP = 60$ ( $= \Delta$ s) $QP = 120$	$\checkmark AP = PS$ $\checkmark$ Reason $\checkmark QP = 120$  $\checkmark \Delta QBR \cong \Delta PBA$ $\checkmark QB = BP$ $\checkmark QP = 120$ (3) (9)

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## QUESTION/VRAAG 8



8.1.1

$AB = DC$   
 $AE + EB = DF + FC$  (opp sides of a parallelogram equal)  
 $AE = CF$  (given)  
 $\therefore EB = DF$   
 $DF \parallel EB$  (opp sides parallelogram parallel)  
 $EDFB$  is a parallelogram (one pair opp sides = and  $\parallel$ )  
 $\therefore ED \parallel FB$   
 $\therefore DJ \parallel BK$

✓ S/R

✓  $EB = DF$ 

✓ S/R

✓ R

✓  $ED \parallel FB$ 

(5)

**OR/OF**In  $\triangle AED$  and  $\triangle CFB$ 

- $FC = AE$  (given)
- $\hat{C}_1 + \hat{C}_2 = \hat{A}_1 + \hat{A}_2$  (opp  $\angle \parallel m \Rightarrow$ )
- $BC = AD$  (opp sides  $\parallel m \Rightarrow$ )

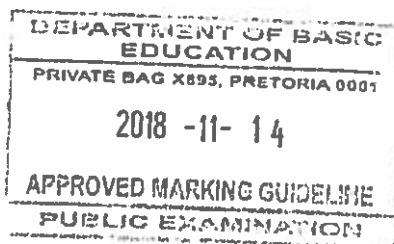
 $\triangle AED \cong \triangle CFB$  (S $\angle$ S) $\hat{E}_3 = \hat{F}_3$  ( $\cong \Delta s$ ) $\hat{E}_3 = \hat{D}_1$  (alt  $\angle s$ ;  $AB \parallel DC$ ) $\hat{F}_3 = \hat{D}_1$  $DJ \parallel BK$  (corres  $\angle s \Rightarrow$ )✓  $\triangle AED \cong \triangle CFB$ ✓  $\hat{E}_3 = \hat{F}_3$ 

✓ S/R

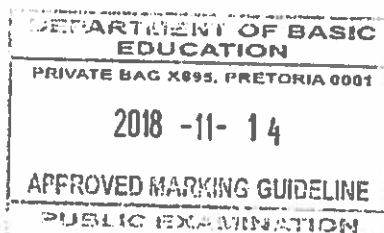
✓  $\hat{F}_3 = \hat{D}_1$ 

✓ R

(5)



	<p><b>OR/OF</b>            In <math>\triangle AED</math> and <math>\triangle CFB</math></p> <ol style="list-style-type: none"> <li><math>FC = AE</math> (given)</li> <li><math>\widehat{C}_1 + \widehat{C}_2 = \widehat{A}_1 + \widehat{A}_2</math> (opp <math>\angle</math> <math>\parallel</math> m <math>\Rightarrow</math>)</li> <li><math>BC = AD</math> (opp sides <math>\parallel</math> m <math>\Rightarrow</math>)</li> </ol> <p><math>\triangle AED \equiv \triangle CFB</math> (S<math>\angle</math>S)  <math>DE = FB</math> (= <math>\Delta</math>s)  <math>AB = DC</math>  <math>AE + EB = DF + FC</math> (opp sides of a parallelogram equal)  <math>AE = CF</math> (given)  <math>\therefore EB = DF</math>  <math>EDFB</math> is a parallelogram (both pairs opp sides =)  <math>DE \parallel FB</math> (opp sides <math>\parallel</math> m <math>\parallel</math>)  <math>DJ \parallel KB</math></p>	<p>✓ <math>\triangle AED \equiv \triangle CFB</math>            ✓ <math>DE = FB</math>            ✓ S/R            ✓ <math>EB = DF</math>            ✓ Reason</p>
8.1.2	<p><math>\widehat{E}_1 = \widehat{D}_1</math> (corres. <math>\angle</math>s, <math>AB \parallel DC</math>)  <math>\widehat{F}_1 = \widehat{D}_1</math> (alt. <math>\angle</math>s, <math>DE \parallel FB</math>)  <math>\therefore \widehat{E}_1 = \widehat{F}_1</math></p> <p><b>OR/OF</b>  <math>\widehat{E}_1 = \widehat{D}_1</math> (alt. <math>\angle</math>s, <math>AB \parallel DC</math>)  <math>\widehat{F}_1 = \widehat{D}_1</math> (alt. <math>\angle</math>s, <math>DE \parallel FB</math>)  <math>\therefore \widehat{E}_1 = \widehat{F}_1</math>  <math>\widehat{E}_3 = \widehat{E}_1</math> (vert. opp. <math>\angle</math>s)  <math>\therefore \widehat{E}_1 = \widehat{F}_1</math></p> <p><b>OR/OF</b>  <math>\widehat{E}_1 = \widehat{D}_1</math> (corres <math>\angle</math>s, <math>AB \parallel DC</math>)  <math>\widehat{F}_3 = \widehat{D}_1</math> (corres <math>\angle</math>s, <math>DE \parallel FB</math>)  <math>\therefore \widehat{E}_3 = \widehat{F}_3</math>  <math>\widehat{F}_3 = \widehat{F}_1</math> (vert. opp. <math>\angle</math>s)  <math>\therefore \widehat{E}_1 = \widehat{F}_1</math></p> <p><b>OR/OF</b>  <math>EDFB</math> is a parallelogram (proven in 8.1.1)  <math>\widehat{E}_2 = \widehat{F}_2</math> (opp <math>\angle</math>s <math>\parallel</math> m <math>\Rightarrow</math>)  <math>\widehat{E}_1 = \widehat{F}_1</math> (<math>\angle</math>s on straight line)</p>	<p>✓ S ✓ R            ✓ S ✓ R            (4)</p> <p>✓ S ✓ R            ✓ S            ✓ S/R            (4)</p> <p>✓ S ✓ R            ✓ S            ✓ S/R            (4)</p> <p>✓ S ✓ R            ✓ S ✓ R            (4)</p>



<p>8.2</p>				
<p>8.2.1</p>	<p> <math>AP = BP</math> (given)  <math>OA = OB</math> (radii)  <math>OAPB</math> is a kite (two pairs adj sides =)  <math>AT = TB</math> (one diag of kite bisects the other)         </p> <p><b>OR/OF</b></p> <p>In <math>\triangle OAP</math> and <math>\triangle OBP</math></p> <ol style="list-style-type: none"> <li><math>AP = BP</math> (given)</li> <li><math>OA = OB</math> (radii)</li> <li><math>OP</math> is common</li> </ol> <p><math>\therefore \triangle OAP \cong \triangle OBP</math> (SSS)</p> <table border="0" style="width: 100%;"> <tr> <td style="width: 50%; vertical-align: top;"> <math>\hat{O}_1 = \hat{O}_2</math> (<math>\cong \Delta s</math>)                  In <math>\triangle OAT</math> and <math>\triangle OBT</math> <ol style="list-style-type: none"> <li><math>\hat{O}_1 = \hat{O}_2</math> (<math>\cong \Delta s</math>)</li> <li><math>OA = OB</math> (radii)</li> <li><math>OT</math> is common</li> </ol> <p><math>\therefore \triangle OAT \cong \triangle OBT</math> (S<math>\angle</math>S)</p> <p><math>AT = TB</math> (<math>\cong \Delta s</math>)</p> </td> <td style="width: 50%; vertical-align: top;"> <math>\hat{P}_1 = \hat{P}_2</math> (<math>\cong \Delta s</math>)                  In <math>\triangle PAT</math> and <math>\triangle PBT</math> <ol style="list-style-type: none"> <li><math>\hat{P}_1 = \hat{P}_2</math> (<math>\cong \Delta s</math>)</li> <li><math>AP = PB</math> (given)</li> <li><math>PT</math> is common</li> </ol> <p><math>\triangle PAT \cong \triangle PBT</math> (S<math>\angle</math>S)</p> </td> </tr> </table>	$\hat{O}_1 = \hat{O}_2$ ( $\cong \Delta s$ ) In $\triangle OAT$ and $\triangle OBT$ <ol style="list-style-type: none"> <li><math>\hat{O}_1 = \hat{O}_2</math> (<math>\cong \Delta s</math>)</li> <li><math>OA = OB</math> (radii)</li> <li><math>OT</math> is common</li> </ol> <p><math>\therefore \triangle OAT \cong \triangle OBT</math> (S<math>\angle</math>S)</p> <p><math>AT = TB</math> (<math>\cong \Delta s</math>)</p>	$\hat{P}_1 = \hat{P}_2$ ( $\cong \Delta s$ ) In $\triangle PAT$ and $\triangle PBT$ <ol style="list-style-type: none"> <li><math>\hat{P}_1 = \hat{P}_2</math> (<math>\cong \Delta s</math>)</li> <li><math>AP = PB</math> (given)</li> <li><math>PT</math> is common</li> </ol> <p><math>\triangle PAT \cong \triangle PBT</math> (S<math>\angle</math>S)</p>	<p> <math>\checkmark</math> S  <math>\checkmark</math> <math>OA = OB</math>  <math>\checkmark</math> <math>OAPB</math> is a kite/'n vlieër  <math>\checkmark</math> two pairs adj sides =  <math>\checkmark</math> reason/rede (5)         </p> <p> <math>\checkmark</math> <math>AP = BP</math>  <math>\checkmark</math> <math>OA = OB</math> </p> <p> <math>\checkmark</math> <math>\hat{O}_1 = \hat{O}_2</math> or <math>\hat{P}_1 = \hat{P}_2</math> (<math>\cong \Delta s</math>)         </p> <p> <math>\checkmark \therefore \triangle OAT \cong \triangle OBT</math>              or <math>\triangle PAT \cong \triangle PBT</math>  <math>\checkmark \cong \Delta s</math> (5)         </p>
$\hat{O}_1 = \hat{O}_2$ ( $\cong \Delta s$ ) In $\triangle OAT$ and $\triangle OBT$ <ol style="list-style-type: none"> <li><math>\hat{O}_1 = \hat{O}_2</math> (<math>\cong \Delta s</math>)</li> <li><math>OA = OB</math> (radii)</li> <li><math>OT</math> is common</li> </ol> <p><math>\therefore \triangle OAT \cong \triangle OBT</math> (S<math>\angle</math>S)</p> <p><math>AT = TB</math> (<math>\cong \Delta s</math>)</p>	$\hat{P}_1 = \hat{P}_2$ ( $\cong \Delta s$ ) In $\triangle PAT$ and $\triangle PBT$ <ol style="list-style-type: none"> <li><math>\hat{P}_1 = \hat{P}_2</math> (<math>\cong \Delta s</math>)</li> <li><math>AP = PB</math> (given)</li> <li><math>PT</math> is common</li> </ol> <p><math>\triangle PAT \cong \triangle PBT</math> (S<math>\angle</math>S)</p>			
<p>8.2.2</p>	<p> <math>\hat{O}TA = 90^\circ</math> (properties of a kite)         </p> <p><b>OR/OF</b></p> <p> <math>\hat{O}TA = \hat{O}TB</math> (<math>\triangle OTA \cong \triangle OTB</math>)              but: <math>\hat{O}TA + \hat{O}TB = 180^\circ</math> (<math>\angle</math>s on a str.line)  <math>\therefore \hat{O}TA = 90^\circ</math> </p>	<p> <math>\checkmark</math> R (1)         </p> <p> <math>\checkmark</math> R (1)         </p>		
<p>[15]</p>				

DEPARTMENT OF BASIC  
 EDUCATION  
 PRIVATE BAG X995, PRETORIA 0001  
 2018 -11- 14  
 APPROVED MARKING GUIDELINE  
 PUBLIC EXAMINATION

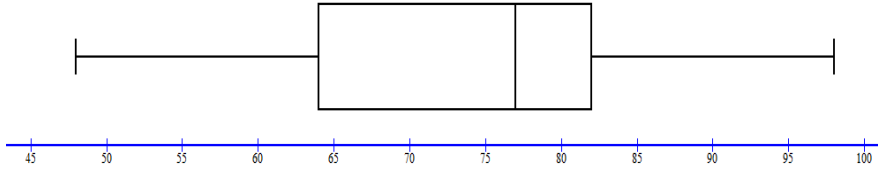
TOTAL/TOTAAL: 100



Consistent accuracy (CA) marking, applies in ALL aspects of the marking guideline.

QUESTION 1

48	50	52	59	60	68	73	76	76	76
78	79	80	81	82	82	84	91	92	98

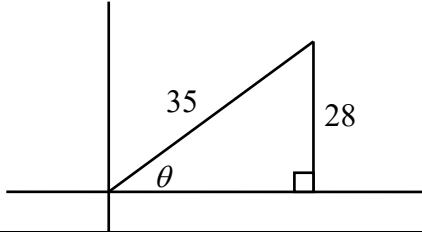
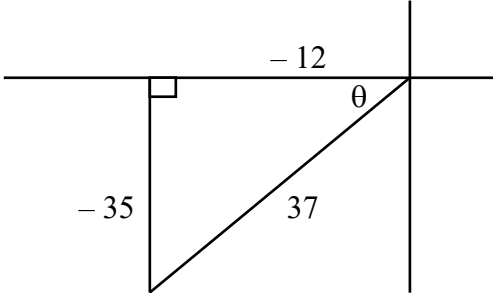
1.1.1	Median = $\frac{76 + 78}{2} = 77$	✓ answer (1)
1.1.2	Lower quartile = $\frac{60 + 68}{2} = 64$ Upper quartile = 82	✓ lower quartile ✓ upper quartile (2)
1.1.3	Interquartile range ( IQR ) = $Q_3 - Q_1$ = $82 - 64 = 18$	✓ substitution ✓ answer (2)
1.1.4	Min = 48 and max = 98	✓ min and max (1)
1.1.5		✓ min and max ✓ $Q_1$ and $Q_3$ ✓ $Q_2$ (3)
1.1.6	Skewed to the left or negatively skewed	✓ answer (1)

1.2	Duration (min)	No of calls ( $f_1$ )	Midpoint ( $x_1$ )	$(f_1) \times (x_1)$	
	$2 \leq t < 5$	47	3,5	164,5	
	$5 \leq t < 8$	139	6,5	903,5	
	$8 \leq t < 11$	211	9,5	2004,5	
	$11 \leq t < 14$	102	12,5	1275	
	$14 \leq t < 17$	58	15,5	899	
	$17 \leq t < 20$	19	<b>A</b>	<b>B</b>	
		576		5598	
1.2.1	<b>A</b> = 18,5 and <b>B</b> = 351,5				✓ answer of A ✓ answer of B (2)
1.2.2	approximate mean = $\frac{\text{sum of } f_1 \times x_1}{\text{sum of } f_1}$ = $\frac{5598}{576}$ = 9,7 minutes				✓ sum of all $(f_1) \times (x_1)$ ✓ sum of all $(f_1)$ ✓ answer (3)
1.2.3	75 <sup>th</sup> percentile lie = $\frac{75}{100} \times 576 = 432$ In the interval $11 \leq t < 14$				✓ 432 ✓ interval (2)
					<b>[17]</b>

QUESTION 2

<p>2.1</p>	<p><math>A(-2; 6)</math>, <math>B(6; 8)</math> and <math>C(4; 0)</math></p> $d_{AB} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(6 - (-2))^2 + (8 - 6)^2}$ $= 2\sqrt{17}$ $d_{BC} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$ $= \sqrt{(4 - 6)^2 + (0 - 8)^2}$ $= 2\sqrt{17}$ <p><math>\therefore AB = BC.</math></p>	<p>✓ formula</p> <p>✓ substitution</p> <p>✓ distance AB</p> <p>✓ substitution</p> <p>✓ distance of BC</p> <p>(5)</p>
<p>2.2</p>	<p>ABCD is a kite adjacent sides are equal</p>	<p>✓ kite</p> <p>✓ motivation</p> <p>(2)</p>
<p>2.3</p>	<p><math>A(-2; 6)</math>, <math>B(6; 8)</math> and <math>C(4; 0)</math></p> <p>Midpoint of BC = <math>\left(\frac{x_2 + x_1}{2}; \frac{y_2 + y_1}{2}\right)</math></p> $= \left(\frac{-2+6}{2}; \frac{8+6}{2}\right) = G(2; 7)$ <p>Midpoint of AB = <math>\left(\frac{x_2 + x_1}{2}; \frac{y_2 + y_1}{2}\right)</math></p> $= \left(\frac{4+6}{2}; \frac{0+8}{2}\right) = H(5; 4)$	<p>✓ formula</p> <p>✓ substitution</p> <p>✓ coordinates of G, mdpt of BC</p> <p>✓ substitution</p> <p>✓ coordinates of H, mdpt of AB</p> <p>(5)</p>
<p>2.4</p>	<p><math>\hat{BAD} = \hat{BCD}</math> (opposite <math>\angle</math>'s of a kite are =)</p> <p><math>\hat{AEH} = \hat{EDB}</math> (corresponding <math>\angle</math>'s, <math>EG \parallel DB</math>)</p> <p>but <math>\hat{EDB} = \hat{BDC}</math> (diagonals of a kite)</p> <p><math>\therefore \hat{AEG} = \hat{BDC}</math></p> <p><math>\therefore \Delta AEG \parallel \Delta CDB.</math> (A A A)</p>	<p>✓ S ✓ R</p> <p>✓ SR</p> <p>✓ 3<sup>rd</sup> angle or reason</p> <p>(4)</p>
		<p>[16]</p>

## QUESTION 3

3.1.1	$x^2 = 35^2 - 28^2$ $x = 21$ $\therefore \cos \theta = \frac{21}{35}$ 	✓ sub in Pythagoras ✓ $x = 21$ ✓ $\frac{21}{35}$ (3)
3.1.2	$\sin^2 \theta + \cos^2 \theta = \left(\frac{28}{35}\right)^2 + \left(\frac{21}{35}\right)^2$ $= 1$ $= \text{RHS}$	✓ $\left(\frac{28}{35}\right)^2$ ✓ $\left(\frac{21}{35}\right)^2$ ✓ 1 (3)
3.2	If $37 \sin \theta + 35 = 0$ $\therefore \sin \theta = -\frac{35}{37}$ $x^2 = 37^2 - 35^2$ $x = 12$  $24 \sec \theta - 70 \cot \theta$ $= 24\left(\frac{37}{-12}\right) - 70\left(\frac{-12}{-35}\right)$ $= -74 - 24$ $= -98$	✓ $\sin \theta = \frac{-35}{37}$ ✓ 3 <sup>rd</sup> quadrant ✓ $x$ value = $-12$ ✓✓ substitution ✓ answer (6)
3.3.1	$8 \cos(x + 10^\circ) = 5$ $\cos(x + 10^\circ) = \frac{5}{8}$ $x + 10^\circ = 51,32^\circ$ $x = 41,32^\circ$	✓ $\cos(x + 10^\circ)$ ✓ $x + 10^\circ$ ✓ answer (3)

<p>3.3.2</p>	$\operatorname{cosec} 2x = 2$ $\sin 2x = \frac{1}{2}$ $2x = 30^0$ $x = 15^0$	<p>✓ <math>\sin 2x = \frac{1}{2}</math>                  ✓ <math>2x = 30^0</math>                  ✓ answer</p> <p>(3)</p>
<p>3.4</p>	$\frac{\sin 30^{\circ} \times \tan 60^{\circ}}{\tan 30^{\circ} \times \cos 60^{\circ}} = \frac{\frac{1}{2} \times \sqrt{3}}{\frac{1}{\sqrt{3}} \times \frac{1}{2}}$ $= 3$ $= \text{RHS}$	<p>✓ <math>\frac{1}{2}</math>                  ✓ <math>\sqrt{3}</math>                  ✓ <math>\frac{1}{\sqrt{3}}</math>                  ✓ <math>\frac{1}{2}</math>                  ✓ answer</p> <p>(5)</p>
<p>3.5.1</p>	$\sin 55^{\circ} = \frac{x}{15}$ $x = 15 \times \sin 55^{\circ}$ $= 12,29^{\circ}$ <p style="text-align: center;"><b>OR</b></p> $\cos 35^{\circ} = \frac{x}{15}$ $x = 12,29^{\circ}$	<p>✓ using <math>\sin 55^{\circ}</math>                  ✓ answer</p> <p>(2)</p> <p>✓ using <math>\cos 35^{\circ}</math>                  ✓ answer</p> <p>(2)</p>
<p>3.5.2</p>	$\tan 21^{\circ} = \frac{4,4}{y}$ $y = \frac{4,4}{\tan 21^{\circ}}$ $= 11,46$ <p style="text-align: center;"><b>OR</b></p> $\tan 69^{\circ} = \frac{y}{4,4}$ $y = 11,46$ <p style="text-align: center;"><b>OR</b></p> $y^2 = 12,29^2 - 4,4^2$ $y = 11,48$	<p>✓ using <math>\tan 21^{\circ}</math>                  ✓ answer</p> <p>(2)</p> <p>✓ Pythagoras                  ✓ answer</p> <p>(2)</p>
		<p>[27]</p>

## QUESTION 4

4.1		<ul style="list-style-type: none"> <li>✓ intercepts</li> <li>✓ turning pts</li> <li>✓ shape</li> </ul> <p style="text-align: right;">(3)</p>
4.2	period of $g = 360^{\circ}$	<ul style="list-style-type: none"> <li>✓ answer</li> </ul> <p style="text-align: right;">(1)</p>
4.3	range of $m(x)$ if $m(x) = -3f(x) + 1$ range of $-3f(x)$ : $-3 \leq y \leq 3$ range of $m(x)$ : $-2 \leq y \leq 4$	<ul style="list-style-type: none"> <li>✓ notation</li> <li>✓✓ endpoints</li> </ul> <p style="text-align: right;">(3)</p>
4.4	g decreasing: $90^{\circ} < x < 270^{\circ}$	<ul style="list-style-type: none"> <li>✓ notation</li> <li>✓ endpoints</li> </ul> <p style="text-align: right;">(2)</p>
4.5	$f(x) \times g(x) < 0$ $90^{\circ} < x < 180^{\circ}$ or $270^{\circ} < x < 360^{\circ}$	<ul style="list-style-type: none"> <li>✓ notation</li> <li>✓ endpoints</li> <li>✓ endpoints</li> </ul> <p style="text-align: right;">(3)</p>
		<b>[12]</b>

**QUESTION 5**

5.1	$\hat{A}DC = 53^\circ$ ( $\angle$ s on a straight line) $\hat{D}CB = 116^\circ$ (supplementary adj $\angle$ s) $\hat{C}BA = 101^\circ$ ( $\angle$ s on a straight line) $\hat{B}AD = 360^\circ - 53^\circ - 116^\circ - 101^\circ$ $= 90^\circ$ ( $\angle$ s of a quad = $360^\circ$ )  Answer only: full marks, provided one reason is given	✓ SR ✓ SR ✓ SR  ✓ answer  (4)
5.2	Let $\hat{D}EB = y$ and $\hat{F}EC = k$ $\therefore \hat{B} = 180^\circ - 2y$ and $\hat{C} = 180^\circ - 2k$ ( $\angle$ s of a $\Delta = 180^\circ$ ) In $\Delta ABC$ : $x + 180^\circ - 2y + 180^\circ - 2k = 180^\circ$ $2y + 2k = x + 180^\circ + 180^\circ - 180^\circ$ $y + k = \frac{1}{2}x + 90^\circ$ $\hat{D}EF = 90^\circ - \frac{1}{2}x$ ( $\angle$ s on a straight line)	✓ SR  ✓ SR  ✓ S  ✓ SR  (4)
		<b>[8]</b>

**QUESTION 6**

6.1.1	$AP = DE$ and $AQ = DF$ (given) $\hat{A} = \hat{D}$ (given) $\Delta APQ \equiv \Delta DEF$ (SAS)	✓ given ✓ $\Delta$ 's similar ✓ reason  (3)
6.1.2	$\hat{A}PQ = \hat{E}$ ( $\Delta APQ \equiv \Delta DEF$ ) But $\hat{B} = \hat{E}$ (given) $\therefore \hat{A}PQ = \hat{B}$ $\therefore PQ \parallel BC$ (a pair of corresponding $\angle$ s are =)	✓ Statement ✓ Statement  ✓ Reason  (3)
6.1.3	$\frac{AB}{DE} = \frac{BC}{EF} = \frac{AC}{DF}$ ( $\Delta ABC \parallel \Delta DEF$ )  $\frac{7,5}{3,5} = \frac{8}{DF}$  $DF = \frac{8 \times 3,5}{7,5}$ $= 3,7$	✓ SR  ✓ substitution  ✓ simplification ✓ answer  (4)
6.2.1	Converse of midpoint theorem	✓ answer  (1)

6.2.2	$BD = \sqrt{32} \therefore AD = \sqrt{32}$ $\therefore EF = \sqrt{32}$ (opp sides of a parallelogram) $\therefore CG = 2\sqrt{32}$ (midpt theorem) $= 8\sqrt{2}$	✓ $BD = AD$ ✓ $S \checkmark R$ ✓ $SR$ ✓ answer (5)
		<b>[16]</b>

**QUESTION 7**

TSA of cone = TSA of hemisphere $\pi r^2 + \pi r s = 3\pi r^2$ $\pi r s = 2\pi r^2$ $s = 2x$ ( $r = x$ ) but $s^2 = h^2 + x^2$ $\therefore h^2 + x^2 = 4x^2$ $\therefore h = \sqrt{4x^2 - x^2}$ $= \sqrt{3}x$	✓ equating the TSA  ✓ use of Pythagoras ✓ substituting $s = 2x$ ✓ h subject of formula (4)
	<b>[4]</b>
<b>TOTAL:</b>	<b>100</b>