



Grade 10

Tutorials Guide

2008

GRADE 10 TUTORIALS

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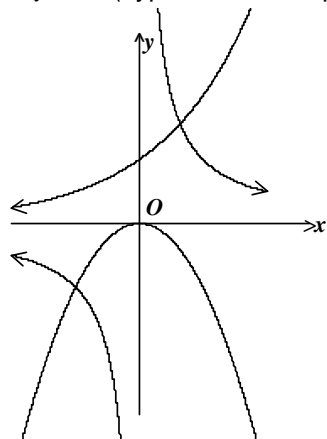
1.1	22; 27; 32	Add 5	1.2	2; 0; -2	Subtract 2
1.3	$4\frac{1}{4}; 5; 5\frac{3}{4}$	Add $\frac{3}{4}$	1.4	81; 243; 729:	Multiply by 3
1.5	21; 34; 55:	Add the previous 2 terms (Fibonacci)			
2.1	10; 12; 14	$T_n = 2n$	2.2	25; 31; 37	$T_n = 6n - 5$
2.3	25; 36; 49	$T_n = n^2$	2.4	9; 5; 1	$T_n = 13 - 4n$
2.5	$5x - 5; 6x - 6; 7x - 7$	$T_n = nx - n$			
2.6	$\frac{1}{6}; \frac{1}{7}; \frac{1}{8}$	$T_n = \frac{1}{n}$	2.7	$\frac{5}{2}; 3; \frac{7}{2}$	$T_n = \frac{n}{2}$
2.8	$2\frac{3}{4}; 2\frac{1}{2}; 2\frac{1}{4}$	$T_n = 3 - \frac{n}{4}$			
3.1.1	6	3.1.2	$3 + n$	3.1.3	the 21 st T
3.2.1	12	3.2.2	$4n$	3.2.3	the 21 st pattern
3.3.1	9	3.3.2	$1 + 2n$	3.3.3	22 triangles
4.1.	24	4.2	120	4.3	$n(n + 2)$
5.1	6	5.2	10	5.3	$\frac{n(n - 1)}{2}$
6.1	8	6.2	72	6.3	16
6.4	200	6.5	968	6.6	$8(2n - 1)^2$

1.1.1 $\frac{1}{2}$ 1.1.2 4 1.1.3 No value 1.1.4 -1 1.1.5 $\frac{1}{2}$

1.1.6 $\frac{1}{2}$ 1.1.7 -4 1.1.8 -4

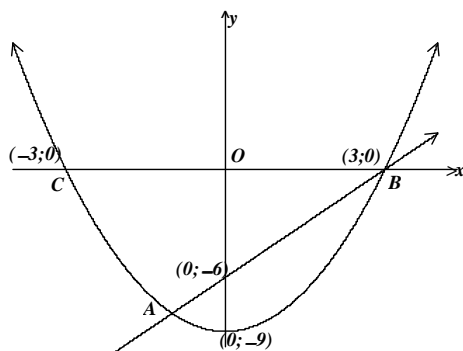
1.2 $f(x)$ is an exponential function, $g(x)$ a hyperbola and $h(x)$ is a parabola.

1.3 Asymptotes $y = 0$ (hyperbola and exponential; $x = 0$ hyperbola)



1.4 f : domain all real numbers; range $[0; \infty)$; g : domain and range $(-\infty; 0) \cup (0; \infty)$
 h : domain all real numbers; range $[0; \infty)$

2.1



2.2.1 $x = -1$ (At A) or $x = 3$ (At B)

2.2.2 $x < -3$ or $x > 3$ (read at C and B)

2.2.3 $q(x) = x^2 - 8$

3.1 $k = 1; c = \frac{1}{2}; b = \frac{1}{2}$ 3.2 $y = \frac{1}{2}$ 3.3 Range = $\left[\frac{1}{2}; \infty\right)$

3.4 $f(x) = 2^x + \frac{1}{2}$

4.1 $f : 2; g : 1$ 4.2 $[-2; 0]$ 4.3 360°

4.4 $a = 2, q = -1$ 4.5 $h(x) = -2 \sin x$

Question 1

$$\begin{aligned} 1.1.1 \quad x^6 \times x^{-2} \div x^2 \\ &= x^{6-2-2} \\ &= x^2 \end{aligned}$$

$$\begin{aligned} 1.1.2 \quad (3p)^q \times 3p^2 \\ &= 3^q p^q \times 3p^2 \\ &= 3^{q+1} p^{q+2} \end{aligned}$$

$$\begin{aligned} 1.1.3 \quad 6^0 \div 12^2 \times 3^3 \\ &= 1 \div (2^2 \cdot 3)^2 \times 3^3 \\ &= 2^4 3^5 \end{aligned}$$

$$\begin{aligned} 1.1.4 \quad \frac{(-x^{-2}y)^2}{(-xy^3)^{-1}} \\ &= \frac{x^{-4}y^2}{-x^{-1}y^{-3}} \\ &= -x^{-3}y^5 \end{aligned}$$

$$1.2.1 \quad 2^{10} \times 2^{10} = 2^{20}$$

$$1.2.2 \quad 2^9 \times 2^{20} = 2^{29}$$

$$1.2.3 \quad \frac{2^{29}}{2^{19}} = 2^{20}$$

$$2.1.1 \quad 5a^2 - 15a$$

$$\begin{aligned} 2.1.2 \quad 2x^2 + 8x - 3x - 1 \\ &= 2x^2 + 5x - 1 \end{aligned}$$

$$2.1.3 \quad 12m^2 + 5m - 2$$

$$2.1.4 \quad 4x^{16} + 16xy + 16y^2$$

$$2.1.5 \quad -3x^2 + 12x + 12$$

$$2.1.6 \quad 36p^2 - 25$$

$$2.1.7 \quad 5y^3 + 36y^2 + 4y - 21$$

$$3.1 \quad 3y(5x-1)$$

$$\left(\frac{1}{2}m+5\right)\left(\frac{1}{2}m-5\right)$$

$$3.2 \quad (3x-2)(x-1)$$

$$3.3 \quad (2x+1)(x-6)$$

$$3.4 \quad 2(r+2)(3s-1)$$

$$3.5 \quad (x+5)(1+q)$$

$$3.6 \quad (x+y)(k-1)$$

$$4.1 \quad -4ab \qquad 4.2 \quad 3y \qquad 4.3 \quad \frac{3m+2}{10m^2} \qquad 4.4 \quad \frac{19-28x}{15x}$$

$$4.5 \quad \frac{3a-b}{2a} \qquad 4.6 \quad \frac{2a-2b+a+b}{2a} \\ = \frac{3a-b}{2a}$$

$$5.1 \quad \text{LHS: } 2(-1-1) = 3$$

$$\text{RHS: } 3 - 4(-1) = 7$$

$x = -1$ not a solution

$$5.2 \quad \text{LHS: } (-1-1)(-1+1) = 0$$

$$\text{RHS: } 0$$

$x = -1$ is a solution

$$5.3 \quad \text{LHS: } 3(-1)(-1-1)^2 - 12$$

$$\text{RHS: } \frac{-4(-1)}{3} = \frac{4}{3}$$

$x = -1$ not a solution

$$5.4 \quad \text{LHS: } \frac{-4(-1)}{3} = \frac{4}{3}$$

$$\text{RHS: } \frac{1}{3}(4 - (-1)) = \frac{5}{3}$$

$x = -1$ not a solution

5.5 LHS: $8^{-1} = \frac{1}{8}$

RHS:

$x = -1$ is a solution

6.1 $7x = 35$
 $x = 5$

6.2 $3x - 18 = -3x - 21$
 $6x = -3$
 $x = -\frac{1}{2}$

6.3 $5x - 6x = 12$
 $x = -12$

6.4 $6x + 3 - 8x + 8 = 5$
 $-3x = -6$
 $x = \frac{1}{2}$

6.5 $x(4x - 3) = 0$
 $x = 0$ or $\frac{3}{4}$

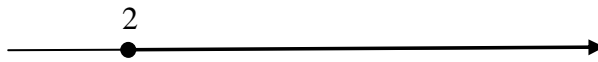
6.6 $(x - 5)(x + 5) = 0$
 $x = \pm 5$

6.7 $(6x - 5)(2x - 1) = 0$
 $x = \frac{5}{6}$ or $\frac{1}{2}$

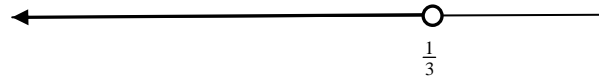
6.8 $5^{x+1} = 5^2$
 $x = 1$

6.9 $3^{x-2} = 27$
 $x = 5$

7.1 $x \geq 2$



7.2 $x < \frac{1}{3}$



8.1 $x = 3,4$ or $-3,1$

8.2 $x = 2,7$

9.1 $x - 5 = 2x + 3$
 $x = -8$
 $y = -8 - 5$
 $y = -13$

9.2 $3x + y = 5$
 $3x - 9y = 0$
 $10y = 5$
 $y = \frac{1}{2}$

10.1 $(2x - 3)cm$ and $(x + 1)cm$

10.2 $(2x - 3) = (x + 1)$
 $x = 4$

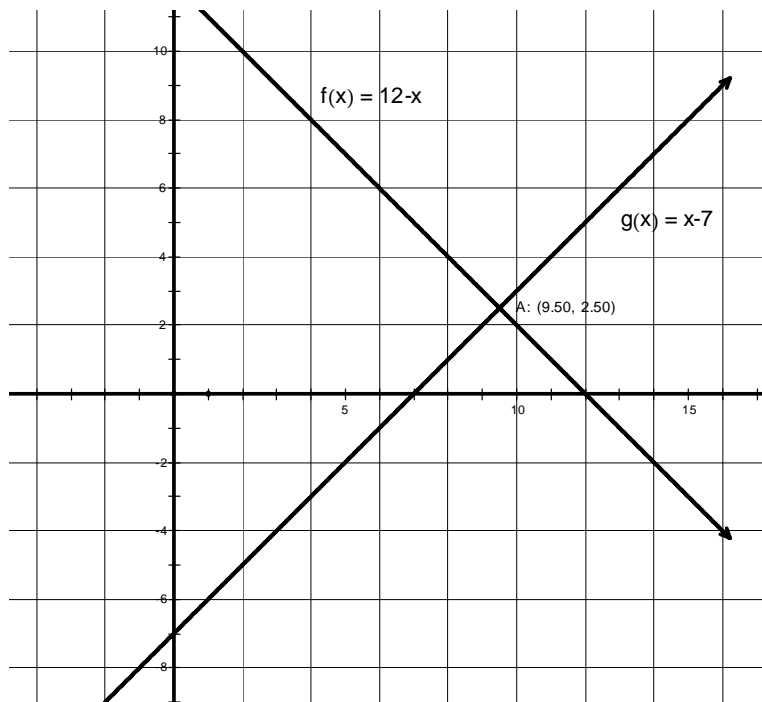
11.1 $C = 3,5x + 250$

11.2 $C = 3,5(234) + 250$
 $C = R1069$

11.2 $684 = 3,5x + 250$
 $x = 124Km$

12.1 $x + y = 12$ and $x - y = 7$

12.2



12.3 $x = 9,5$ and $y = 2,5$

12.4 $9,5 + 2,5 = 12$ and $9,5 - 2,5 = 7$

13. $x^2 - 4x = 12$
 $x^2 - 4x - 12 = 0$
 $(x - 6)(x + 2) = 0$
 $x = 6$ ($x = -2$ *not valid*)

1.1 R7 500

1.2 R8 052,55

1.3 R8 226,54

2 a) R12 950,29

b) R13 300

3 R5 208,33

4 $r = 9,54\%$

5.1 R94 067,29

5.2 R1 567,79

6 CD = R206,90 DVD = R631,30 Music Centre = R2 647,20

7.1 Total Cost for A = R8 150

Total Cost for B = R6 766

∴ B is the better buy

8 After 3 years: $A = 6500\left(1 + \frac{8,5}{100}\right)^3 = R8\ 302,38$ After 5 years: $A = 8302,38\left(1 + \frac{8,5}{100}\right)^3 = R9\ 773,77$ 9.1 $10000 = 5000(1 + 8i)$

$$2 = 1 + 8i$$

$$i = \frac{1}{8} = 12,5\%$$

9.2 $5000(1 + i)^8 = R10000$

$$(1 + i)^8 = 2$$

$$1 + i = 1,090507733$$

$$i = 9,05\%$$

10.1 848,61 Francs

10.2 R31 864,50

10.3 R8389,20

- 1.1 Not right angles, isosceles: $AC = BC = 2\sqrt{5}$
- 1.2 Right angled at P, scalene: $QR^2 = PQ^2 + PR^2 = 26$
- 1.3 Right-angled at Z, isosceles: $YZ = XZ = \sqrt{10}$ and $XY^2 + YZ^2 + XZ^2 = 20$
- 1.4 Equilateral: $PO = OQ = PQ = 2$
- 2.1 $D(-1;0), E(1;3)$
- 2.2 Gradient DE = Gradient BC = $\frac{3}{2}$
- 2.3 $DE = \sqrt{13}$ and $BC = 2\sqrt{13}$
- 2.4 $F(4;1)$
- 2.5 Gradient EF = Gradient AB = $-\frac{2}{3}$
- 3.1 Gradient PA = Gradient MR = $\frac{3}{2}$ and Gradient AR = Gradient PM = -1
- 3.2 $PA = MR = \sqrt{13}$
- 4.1 $RH = HO = OM = RM = 5$
- 4.2 Mid point RO = $(-2;1)$ and mid point MH = $(-2;1)$
- 5. $SQ = QR = RE = ES = \sqrt{10}$ and gradient SQ = gradient ER = 3 and gradient QR = gradient SE = $-\frac{1}{3}$
- 6.1 $y = 1$
- 6.2 Mid point RC = $(\frac{1}{2};1)$ and mid point ET = $(\frac{1}{2};1)$
- 6.3 $RC = ET = 5$
- 7.

	A	B	C	D	Rectangle	Square	Rhombus	Trapezium	Parallelogram	Kite
7.1	$(-2;2)$	$(-2;1)$	$(2;3)$	$(0;3)$				√		
7.2	$(-3;1)$	$(-1;0)$	$(1;1)$	$(-1;2)$			√		√	√
7.3	$(-1;1)$	$(-2;-1)$	$(0;-2)$	$(4;1)$						√
7.4	$(-2;-2)$	$(-3;-4)$	$(2;-2)$	$(3;0)$					√	
7.5	$(-2;2)$	$(0;-1)$	$(3;1)$	$(1;4)$	√	√	√		√	√
7.6	$(-1;2)$	$(-2;0)$	$(2;-2)$	$(3;0)$	√				√	

Question 1

1.1

1.1.1 (3;1)

1.1.2 (6;-4)

1.1.3 (-6;0)

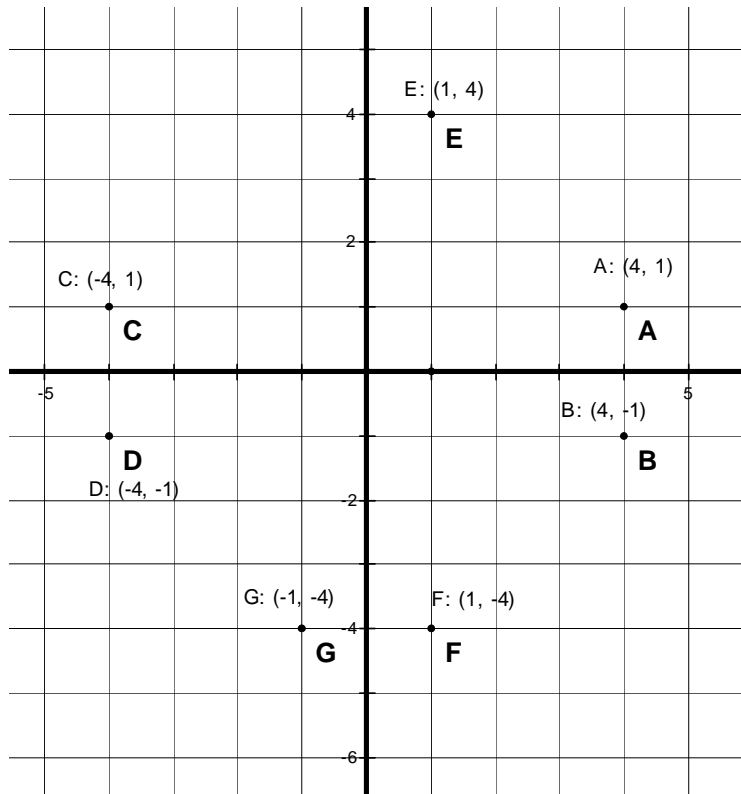
1.1.4 (3;0)

1.1.5 (0;3)

1.1.6 (-8;3)

1.1.7 (2;1)

1.2



Question 2

Point	Image	Transformation
(-2;3)	(1;-1)	$(x; y) \rightarrow (x + 3; y - 4)$
(3;5)	(5;3)	Reflection in $y = x$. (or (2;-2))
(2;-4)	(-2; -4)	Reflection in the line $x=0$
(-1; -1)	(-1;1)	Reflection in the line $y=0$
(-9; 8)	(-6;-4)	A translation according to the mapping $(x; y) \rightarrow (x + 3; y - 4)$, following by a reflection in the x -axis.
(2;7)	(-7; 2)	A reflection in the line $y=x$, followed by a reflection in the y -axis.

Question 3

B: Reflection in x - axis; (-8;1)

C: Reflection in y - axis: (11; -4)

D: Reflection in $y = -x$; (-2;-5)

Question 4

4.1 $y = x$; x - axis; y - axis

4.2 (-3;-1); (-4; -2) and (1;1)

4.3 Reflection $y = x$; reflection x - axis

4.4 $x = 0$; $y = 0$; $y = x$; $y = -x$

4.5

4.5.1 (10; 0)

4.5.2 (7; -7)

Question 5

5.1.1 $AB : y = \frac{1}{3}x + 3$

5.1.2 $AB = \sqrt{40}$

5.1.3 $A' = (-7; -3)$ and $B' = (-1; -1)$

5.1.4 $A'B' : y = \frac{1}{3}x - \frac{2}{3}$

5.1.5 $A'B' = \sqrt{40}$

5.1.6 Yes. One pair of opposite sides is equal and parallel.

$P' = (-1; 2)$; $Q' = (-1; 8)$ and $R' = (-1; 8)$

$$\triangle PQR = \triangle P'Q'R'$$

Because area is preserved in transformation.

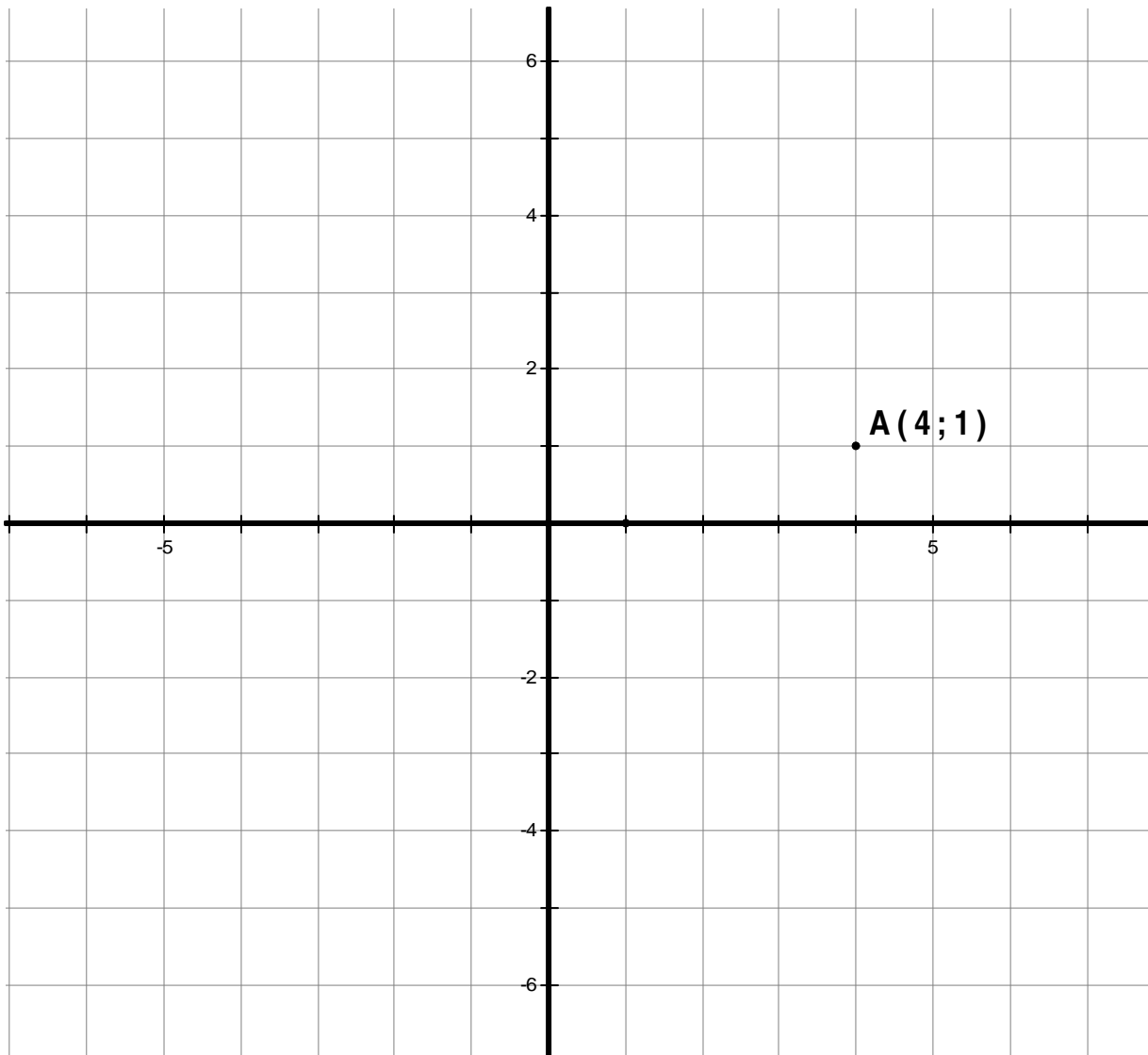
$PQ = 6$ units; Height $PQR = 3$ units

Area $PQR = 9$ square units

Area $PQR = 9$ square units

Diagram Sheet

Question 1.2



Question 2

Point	Image	Transformation
(-2;3)		$(x; y) \rightarrow (x + 3; y - 4)$
(3;5)	(5;3)	
(2;-4)		Reflection in the line $x=0$
	(-1;1)	Reflection in the line $y=0$
	(-6;-4)	A translation according to the mapping $(x; y) \rightarrow (x + 3; y - 4)$, followed by a reflection in the x -axis.
(2;7)		A reflection in the line $y=x$, followed by a reflection in the y -axis.

SECTION A: TRIGONOMETRY

1.1 $\sin \theta = \frac{\textit{opposite}}{\textit{hypotenuse}}$

1.2 $\cos \theta = \frac{\textit{adjacent}}{\textit{hypotenuse}}$

1.3 $\tan \theta = \frac{\textit{opposite}}{\textit{adjacent}}$

2.1 $\sin \theta = \frac{y}{r}$

2.2 $\cos \theta = \frac{x}{r}$

2.3 $\tan \theta = \frac{y}{x}$

3.1

		sin	cos	Tan
3.1.1	\hat{R}	$\frac{PK}{PR} = \frac{PN}{RN}$	$\frac{RK}{PR} = \frac{PR}{RN}$	$\frac{PK}{RK} = \frac{PN}{PR}$
3.1.2	\hat{N}	$\frac{TM}{TN} = \frac{PK}{PN} = \frac{PR}{RN}$	$\frac{MN}{TN} = \frac{NK}{PN} = \frac{PN}{RN}$	$\frac{TM}{MN} = \frac{PK}{KN} = \frac{PR}{PN}$
3.1.3	\hat{K}_1	$\frac{PT}{PK}$	$\frac{KT}{PK}$	$\frac{PK}{KT}$
3.1.4	\hat{K}_2	$\frac{TM}{KT}$	$\frac{KM}{KT}$	$\frac{TM}{KM}$
3.1.5	\hat{T}_1	$\frac{KM}{KT}$	$\frac{TM}{KT}$	$\frac{KM}{TM}$
3.1.6	\hat{T}_2	$\frac{MN}{KT}$	$\frac{TM}{KT}$	$\frac{MN}{TM}$
3.1.7	\hat{P}_1	$\frac{RK}{PR}$	$\frac{PK}{PR}$	$\frac{RK}{PK}$
3.1.8	\hat{P}_2	$\frac{TK}{PK}$	$\frac{PT}{PK}$	$\frac{TK}{PT}$

3.2 \hat{R} and \hat{N} ; \hat{R} and \hat{P}_1 ; \hat{N} and \hat{P}_2 ; \hat{K}_1 and \hat{P}_2 ; \hat{K}_2 and \hat{T}_1 3.3 $\sin x = \cos(90^\circ - x)$; $\cos x = \sin(90^\circ - x)$

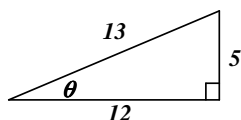
4.1.1 $k = 5$; $\sin \theta = \frac{3}{5}$; $\cos \theta = \frac{4}{5}$; $\tan \theta = \frac{3}{4}$; $\frac{\sin \theta}{\cos \theta} = \frac{3}{4}$; $\sin^2 \theta + \cos^2 \theta = 1$

4.1.2 $k = 15$; $\sin \theta = \frac{8}{17}$; $\cos \theta = \frac{15}{17}$; $\tan \theta = \frac{8}{15}$; $\frac{\sin \theta}{\cos \theta} = \frac{8}{15}$; $\sin^2 \theta + \cos^2 \theta = 1$

4.1.3 $k = 10$; $\sin \theta = \frac{24}{26}$; $\cos \theta = \frac{10}{26}$; $\tan \theta = \frac{24}{10}$; $\frac{\sin \theta}{\cos \theta} = \frac{24}{10}$; $\sin^2 \theta + \cos^2 \theta = 1$

4.2.1 $\frac{7}{d} = \sin 53^\circ$ 4.2.2 $\frac{d}{17} = \cos 31^\circ$ 4.2.3 $\frac{12}{d} = \tan 72^\circ$

4.3

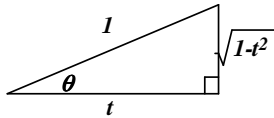


$$4.3.1 \quad \cos \theta = \frac{12}{13} \quad 4.3.2 \quad \tan \theta = \frac{5}{12} \quad 4.3.3 \quad \frac{\sin \theta}{\cos \theta} = \frac{\frac{5}{13}}{\frac{12}{13}} = \frac{5}{12}$$

$$4.3.4 \quad \sin^2 \theta = \left(\frac{5}{13}\right)^2 = \frac{25}{169} \quad 4.3.5 \quad \cos^2 \theta = \left(\frac{12}{13}\right)^2 = \frac{144}{169}$$

$$4.3.6 \quad \sin^2 \theta + \cos^2 \theta = \frac{25}{169} + \frac{144}{169} = 1$$

4.4



$$4.4.1 \quad \sin \theta = \frac{\sqrt{1-t^2}}{1} \quad 4.4.2 \quad \frac{\sin \theta}{\cos \theta} = \frac{\frac{\sqrt{1-t^2}}{1}}{\frac{t}{1}} = \frac{\sqrt{1-t^2}}{t}$$

$$4.4.3 \quad \sin^2 \theta + \cos^2 \theta = \left(\frac{\sqrt{1-t^2}}{1}\right)^2 + \left(\frac{t}{1}\right)^2 = 1$$

$$4.4.4 \quad \text{a) } \frac{\sin \theta}{\cos \theta} = \tan \theta \quad \text{b) } \sin^2 \theta + \cos^2 \theta = 1$$

5.1 28,7° 5.2 72,9° 5.3 73,7° 5.4 No solution

5.5 25,4° 5.6 59,0° 5.7 28,2° 5.8 28,7°

5.9 21,1° 5.10 115,4° 5.11 21,6°

6.1 22,4 6.2 56,3

7.1 $\frac{h}{b}$ 7.2 $\frac{h}{a}$ 7.3 49,3cm

8.1 $\frac{CD}{CB}; \frac{CB}{CA}$ 8.2 5,6cm 8.3 $\sin 56^\circ$

9.1 8,89 units 9.2 11,96 units

10. 57,6m 11. 22,9m

SECTION B

1.1 Prism: 2 808 cm², cylinder: 2 261,95 cm² 1.2 Prism: 9 720 cm³, cylinder: 169 646 cm³

1.3 6 912 cm² 1.4 67 858,4 cm³

2.1 141 371,67 cm³ 2.2 28 274,3 cm³

3.1 80 110,61 cm³ 3.2 80,11 l

4.1 15 180 cm³ 4.2 9 cm 4.3 114 511,05 cm³

4.4 47 488,95 cm³

1.1 Calories = $613 + 522 + 489 + 369 = 1993$

$$\therefore \% \text{ of daily amt} = \frac{1993}{2750} \times 100 = 72,47\%$$

1.2.1 Mean: $\bar{x} = 14,29g$

Median: 8

Mode: 0

1.2.2 Three measures vastly different, data skewed by drinks, onions and chips that no protein. Median and mode are not helpful. Although the mean is the best of the three, it too is affected by the menu items with no protein content. (any reasonable explanation)

1.3.1 $\bar{x} = 38$ median: 40 Mode: 43

1.3.2 All measures similar to each other. Although there are some foods with a high content, they are balanced by those with a low content.

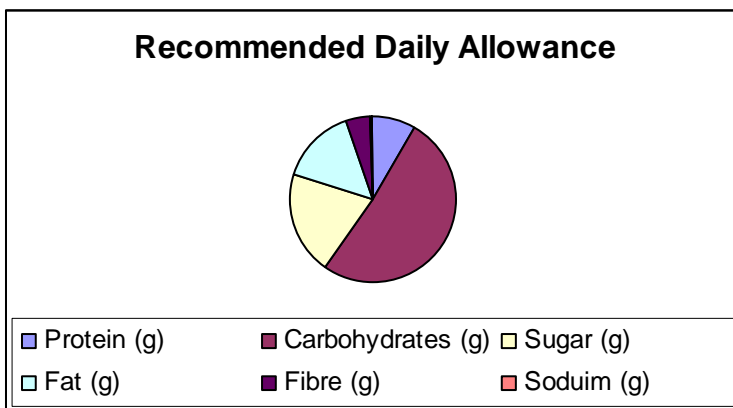
1.4 All three have low calorie content, significantly lower than other items, leading to skewed data

1.5.1 Range (max – min): $90 - 0 = 90$

Inter quartile range: $8 - 2 = 6$

1.5.2 Both Coke items heavily laden with sugar which makes the range very large. Interquartile range a better reflection of the data as there is a very low sugar content in the other menu items.

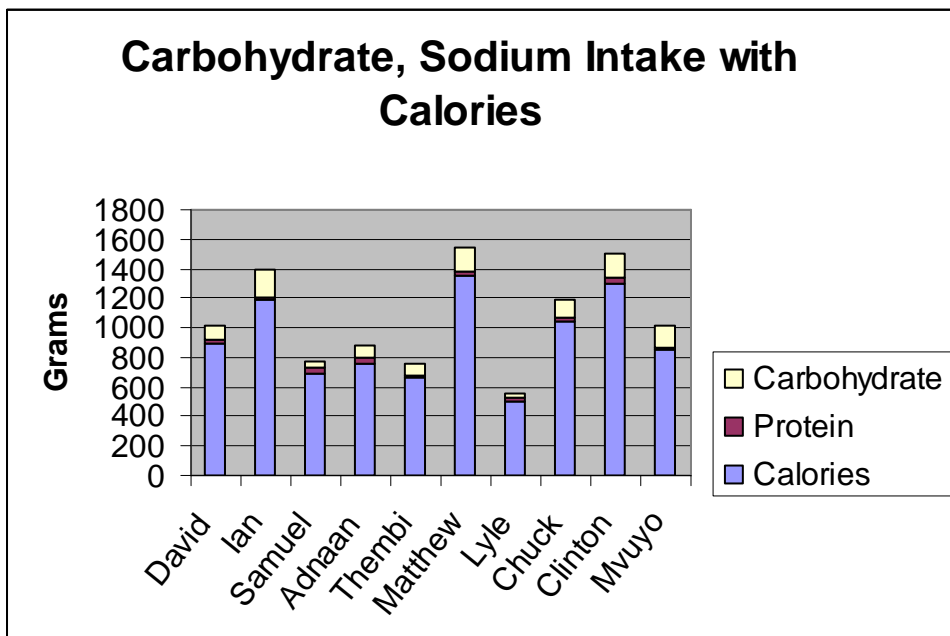
2



3.1

	Calories	Protein	Carbohydrate
David	898	28	86
Ian	1186	24	186
Samuel	695	39	40
Adnaan	764	28	83
Thembi	662	21	73
Matthew	1347	31	161
Lyle	496	34	28
Chuck	1038	33	119
Clinton	1306	29	161
Mvuyo	858	5	155

3.2



3.3 Bad choice, high in calorie count and carbohydrate yet very low on protein

4 Any motivated argument acceptable. Should make mention of the fact that although the time in which extra staff are on duty includes the peak time, there are other time slots outside of the 3 – 9 slot that are very busy and require extra assistance. No of items sold between 3- 6 when the extra help arrives actually drops for a period before the peak time starts. Late night is also very busy and should have extra staff on duty.